

School of Public Health

**Are attitudes and intentions towards sex associated with  
risky sexual behaviour in urban Western Australian  
adolescents?**

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This thesis is presented for the Degree of  
Doctor of Philosophy  
of  
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## DECLARATION

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

A handwritten signature in dark ink, appearing to read 'Hendriks', followed by a period.

**Jacqueline Hendriks**

May, 2014

For Saskia & Imogen

## ACKNOWLEDGEMENTS

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## STATEMENT OF CANDIDATE CONTRIBUTION

This thesis is an original composition, compiled under the supervision of Professor Sue Fyfe (Supervisor), Associate Professor S. Rachel Skinner (Associate Supervisor) and Dr Irene Styles (Associate Supervisor).

During the period 2006 to 2008, Jacqueline Hendriks (PhD candidate) was employed as a research assistant for a mixed methods research project exploring the biopsychosocial antecedents to adolescent pregnancy. The project was funded by an Australian National Health and Medical Research Council grant (number 353661), and was referred to as the “Teen Relationships Study.” It operated out of the School of Paediatrics and Child Health, at the University of Western Australia. The Chief Investigator for this project was Associate Professor S. Rachel Skinner. Professor Sue Fyfe and Dr Irene Styles were also part of the investigative team.

Data collected from the “Teen Relationships Study” was used for this doctoral research.

As a research assistant, the candidate was closely involved with all aspects of the “Teen Relationships Study.” Under guidance of the investigative team, the job role included the following tasks: writing ethics applications and ensuring all administrative requirements were up-to-date, sourcing potential recruitment sites, recruiting interview participants, conducting semi-structured interviews, preliminary analysis of interview data, generating questionnaire items from interview data, sourcing additional questionnaire items, finalising overall structure and formatting of the questionnaire, overseeing development of an online version of the questionnaire, collection of questionnaire data, data entry and data cleaning. For further information, a detailed explanation of the “Teen Relationships Study” and the project method is provided in Chapter Three.

Once data cleaning had commenced, the candidate ceased employment as a research assistant and was given a position as an Adjunct Research Fellow at the University of Western Australia. She then enrolled in the doctoral thesis program through Curtin University.

The candidate was responsible for all Rasch analyses, under the guidance of Dr Irene Styles. Some help was obtained from Professor David Andrich and Professor Ida Marais.

Statistical analyses of the Rasch data were performed by Angela Jacques under the guidance of the candidate, Adjunct Professor Dorota Doherty, Associate Professor S. Rachel Skinner and Professor Sue Fyfe.

The candidate drafted the original thesis and peer-reviewed publication, with feedback provided by all supervisors. Associate Professor Sharyn Burns, Associate Professor Maryanne Doherty- Poirier and Dr Gareth Merriman reviewed sections of this manuscript.

## PUBLICATIONS

Hendriks, J., Fyfe, S., Styles, I., Skinner, S. R., & Merriman, G. (2012). Scale construction utilising the Rasch unidimensional measurement model: A measurement of adolescent attitudes towards abortion. *Australasian Medical Journal*, 5(5), 251-261.



## ABSTRACT

Australian adolescents are disproportionately affected by the negative outcomes of early pregnancy and sexually transmitted infections (STIs) in comparison to older adults.

Comprehensive and systematic reviews of interventions seeking to reduce these events have repeatedly identified the importance of attitudes. Theoretical perspectives of health behaviour have linked personal attitudes to behaviour change. Similarly, personal attitudes have been identified as one of the easiest issues to address in relation to pregnancy and STI prevention.

This research was concerned with the sexual health and behaviours of Australian heterosexual adolescents living in Perth, Western Australia. The aim was to determine if attitudes and intentions towards abortion, adolescent parenthood and contraception were associated with sexual behaviours that place them at risk of an unwanted pregnancy or STI.

Data collected from a previous research project, entitled the “Teen Relationships Study” was used for this current study. In this previous project, an extensive questionnaire was disseminated to adolescents attending secondary schools, antenatal clinics or pregnancy termination services. Females were sampled at each site and males were sampled from secondary schools only. The sampling framework was structured to gather data from adolescents with varying experiences of sexual activity and pregnancy. The questionnaire gathered information related to the attitudes of adolescents towards abortion, adolescent parenthood and contraception; psychosocial factors, sexual behaviour and risky sexual behaviour (RSB; i.e. early sexual debut, unprotected sexual intercourse, multiple sex partners, sexual activity whilst under the influence of alcohol and/or other drugs and a history of unwanted sexual activity) were also investigated.

Completed questionnaires were received from 1681 participants, with 1616 adolescents (490 males, 1126 females) aged 12-19 years completing at least one of the attitude scales relating to this research (i.e. abortion, adolescent parenthood or contraception). Of these, 268 adolescent females reported a previous pregnancy that resulted in either a live birth (n=76) or termination (n=192).

The Rasch Unidimensional Measurement Model was applied to the data collected from the 1616 adolescents to create three separate attitude scales: the “Adolescent Attitudes towards Abortion Scale”, the “Adolescent Attitudes towards Adolescent Parenthood Scale” and the “Adolescent Attitudes towards Contraception Scale.” Each scale was shown to be

unidimensional and interval-level person locations (Rasch scores) of attitude were obtained.

The Rasch scores underwent a series of descriptive, univariate and multivariable analyses. Mean person locations (reported in logits) were initially described for all cases using t-tests or one-way analysis of variance (ANOVA) as appropriate. For each gender, means were compared by both age and sexual activity status (sexually active vs. not sexually active). Amongst sexually active participants, means were compared for each gender by duration of sexual activity (<1 year vs. ≥1 year) and within selected RSBs. For sexually active females, means were compared across different pregnancy outcomes (never pregnant, pregnant–continuing or pregnant–terminating). Potential correlates (or explanatory variables) included demographic, individual, familial and extrafamilial variables. Variables relating to sexual behaviour and RSB were analysed for sexually active participants.

For each attitude scale, a predicted value of mean person location (i.e. a predicted scale score) was calculated based on a linear combination of independent explanatory variables. A series of adjusted univariate and multivariable regressions were undertaken to quantify the relative contribution of correlates. Once the final multivariable model for a particular attitude scale was derived, it was replicated with the addition of the two other scale scores to determine their combined effect.

**Support for abortion** was most common amongst older females (versus younger females), sexually active participants (versus sexually inactive participants) and sexually active females who had previously terminated a pregnancy (versus sexually active females who had never been pregnant or had continued with a pregnancy). **Support for adolescent parenting** was most common amongst males (versus females), older females (versus younger females), sexually active females (versus sexually inactive females), females who had been sexually active for at least a year (versus females who had only commenced sexual activity in the previous 12 months) and females who reported a previous pregnancy (versus females who were sexually active but had never been pregnant). **Support for contraception** (both barrier and hormonal methods) was most common amongst females (versus males), older males (versus younger males), sexually active males (versus sexually inactive males), younger females (versus older females), sexually inactive females (versus sexually active females) and females who had only recently begun sexual activity (versus females who had been sexually active for at least a year). Amongst sexually active females, previous pregnancy history (i.e. never pregnant, pregnant–continuing or pregnant–terminating) was not associated with contraceptive attitude.

**Amongst sexually active adolescents, attitudes towards abortion, adolescent parenthood and contraception were each associated with certain RSBs.** Sexual activity at an early age was linked to positive abortion attitudes and, for females, positive attitudes towards adolescent parenting. For both sexes, infrequent or non-use of condoms and other contraceptive methods was associated with support for abortion and negative attitudes towards contraception. For females, it was associated with support for adolescent parenting. Having multiple sexual partners in the past year was associated with support for abortion and negative attitudes towards contraception. An unwanted sexual encounter was associated with negative attitudes towards contraception. For females, being drunk or high at last sexual encounter was associated with reduced support for adolescent parenting. When a broad range of possible explanatory factors were considered, these RSBs proved to be poorly correlated with each attitude. Instead, adolescents' attitudes in one domain proved to be highly associated with their attitudes in other areas.

A model was created to illustrate the relationship between attitudes towards abortion, adolescent parenthood and contraception for sexually active adolescent females. **In the examination of contraceptive attitudes for sexually active females,** less support for adolescent parenting was associated with greater support for contraception in some circumstances. **In the examination of adolescent parenthood attitudes for sexually active females,** positive attitudes towards contraception and abortion were associated with less support for adolescent parenting. **In the examination of abortion attitudes for sexually active females,** less support for adolescent parenting was associated with greater support for abortion. Attitudes towards contraception and abortion did not influence each other.

The findings from this study provide an extensive summary of Australian adolescents' attitudes towards abortion, adolescent parenthood and contraception. The three attitude scales created as part of this research can support the work of educators, sexual health professionals and researchers seeking to measure sexual health attitudes. In the prediction of adolescent attitudes, a broad range of potential explanatory variables were considered and the relative contribution of correlates was quantified. The attitude response patterns of adolescents at high risk for early pregnancy and STI were identified. Overall, the findings support intervention efforts that address sexual health attitudes; with a recommendation that practitioners focus on the formation of positive attitudes towards contraception. Additional implications for current practice are discussed and recommendations for future research are made.

## ABBREVIATIONS

AAA Scale	“Adolescent Attitudes towards Abortion Scale”
AAAP Scale	“Adolescent Attitudes towards Adolescent Parenthood Scale”
AAC Scale	“Adolescent Attitudes towards Contraception Scale”
AIDS	Acquired Immunodeficiency Syndrome
ANOVA	Analysis of variance
ARCSHS	Australian Research Centre in Sex, Health and Society
ASHR	Australian Study of Health and Relationships
ATSI	Aboriginal or Torres Strait Islander
CCC	Category characteristic curve
DIF	Differential item functioning
HIV	Human Immunodeficiency Virus
HPV	Human Papilloma Virus
ICC	Item characteristic curve
PSI	Person separation index
RSB	Risky sexual behaviour
RUMM2030	Rasch Unidimensional Measurement Model 2030
SDQ	Strengths & Difficulties Questionnaire
SEIFA	Socio-Economic Index for Areas
STI	Sexually transmitted infection

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## CHAPTER 1

### *Introduction*

## 1.0. Overview

In this chapter the current context of the study is briefly outlined. The research aim and objectives are stated, along with the significance of the study and its scope. The chapter concludes by providing an overview of the structure of the thesis.

## 1.1. Current context and research focus

Adolescents, defined by the World Health Organization to be all people aged 10-19 years (World Health Organization, 2001), are disproportionately affected by the negative outcomes of unwanted sex, early pregnancy and sexually transmitted infections (STIs) (Bearinger, Sieving, Ferguson, & Sharma, 2007; Glasier, Gülmezoglu, Schmid, Moreno, & van Look, 2006). In developed nations particularly, the health care needs of adolescents have changed in recent decades due to the increasing gap between puberty, marriage and childbearing (Bearinger et al., 2007; Wellings et al., 2006). Whilst Australians in general, enjoy relatively high levels of sexual and reproductive health, adolescents and young people are adversely affected at higher rates and are considered a priority population for interventions in this area (O'Rourke, 2008); with some academics criticising the government's failure to prioritise such interventions on the public health agenda (O'Rourke, 2008; H. Williams & Davidson, 2004).

Systematic reviews have identified that of all known risk and protective factors affecting adolescent sexual behaviour, pregnancy, childbearing and STI; adolescents' sexual beliefs, values, attitudes and intentions are the most strongly related to sexual behaviour and the most amenable to change (Kirby, 2007; Kirby & Lepore, 2007). Despite these findings, and the research surrounding the influence of values, attitudes and beliefs on behaviour (Ajzen, 2005), these concepts are often neglected in intervention strategies and education programs. There is also criticism that ineffective measurement techniques have hampered efforts to appropriately assess these psychosocial constructs (Ajzen & Fishbein, 2005; Eagly & Chaiken, 1993).

In response to these issues, this research project explored the role of attitudes and intentions when an adolescent engages in risky sexual behaviour (RSB). Such behaviours included commencement of sexual activity at an early age, failure to consistently and correctly use condoms or other contraceptives, a history of multiple sex partners, sexual activity whilst under the influence of drugs and/or alcohol, or an unwanted sexual

encounter. Initially, three scales were developed and validated to measure the sexual attitudes and intentions of adolescents, with the intention that these scales could subsequently be used by sexual health educators and researchers. The scales measured adolescent attitudes towards abortion, adolescent parenthood and contraception. A contemporary technique of scale construction, entitled the Rasch Unidimensional Measurement Model (Rasch, 1960/1980), was utilised to produce scales with invariant measurement properties. The scale scores of adolescents who had engaged in RSB were compared with their peers and the influence of other individual, familial and extrafamilial factors were investigated. The focus was on Australian heterosexual adolescents; specifically those living in Perth, Western Australia.

## 1.2. Research aims and objectives

The aim of this research project was:

*to determine if the attitudes and intentions held by adolescents in Perth, Western Australia, are associated with sexual behaviours that place them at risk of an unwanted pregnancy or sexually transmitted infection.*

The following objectives were met in the course of this investigation:

- i. Construct unidimensional interval scales to measure the attitudes and intentions of adolescents in relation to abortion, adolescent parenthood and contraceptive use.
- ii. Determine both the construct validity and the reliability of the attitude and intention scales using the Rasch Unidimensional Measurement Model, and modify the scale(s) based on these analyses.

Utilising the scales developed in the first two objectives:

- iii. Describe the attitudes and intentions of adolescents living in Perth, Western Australia in relation to their sexual histories.
- iv. Determine the effect of individual, familial and extrafamilial factors on attitudes and intentions.
- v. Determine whether adolescents who have engaged in risky sexual behaviour hold different attitudes and intentions from their peers who have not engaged in these behaviours.
- vi. Determine the association between the scale scores and risky sexual behaviour when considering other individual, familial and extrafamilial factors.



### 1.3. Significance of the study

Greater understanding of the relative contribution of attitudes, to the sexual health of adolescents, will assist in the development of interventions to address the RSB, unplanned pregnancy, unwanted sexual activity and STI transmission evident in this age group. Similarly, a better appreciation of how these attitudes vary in specific populations will enable interventions to be targeted appropriately.

Most research into sexual health attitudes has used American college students. Within Australia, a national survey of Australian secondary students has been carried out by researchers at regular intervals over the past two decades, documenting changes in sexual-based knowledge, beliefs and behaviours (Mitchell, Patrick, Heywood, Blackman, & Pitts, 2014). Whilst findings from this survey help to broadly illustrate adolescent sexual health issues within Australia, this current research project provides a more detailed examination of adolescent attitudes in three specific areas: abortion, adolescent parenthood and contraception.

This project is the first time such detailed research on the sexual attitudes and behaviours of adolescents has been undertaken in Perth, Western Australia. Previous research documenting the sexual attitudes of adolescents and young adults has considered basic explanatory variables such as age, gender, religion and peers. This current study has expanded upon previous work by exploring a much broader range of variables and by quantifying the relative contribution of correlates.

Whilst data has been collected from sexually active and inactive males and females, a unique sampling framework also captured a large proportion of adolescent females with varying experiences of pregnancy, childbirth and abortion.

The Rasch Unidimensional Measurement Model, a technique essential for the construction of unidimensional invariant scale scores (Rasch, 1960/1980) will be explained. Whilst many recent works have utilised the Rasch Model, and comparisons with other techniques (e.g. Classical Test Theory) have already been made (Cavanagh & Romanoski, 2006; Kline, 2005), this research provided a unique opportunity to apply the technique to attitudinal data in the domain of adolescent sexual health. Accurate assessment of attitude scores will improve our understanding of these concepts and the development of effective sexual health interventions.

This research will provide further insight into the relationships between attitude, intention and behaviour; specifically within the context of adolescent sexual behaviour. The relative

importance of these constructs on resultant sexual behaviour will be highlighted. Findings may be used to inform strategies that seek to promote sexual health in adolescence. As an example, findings may help to shape the content of sexual health curricula.

Finally, the project will identify attitude and intention response patterns which may be typical of particularly high risk groups of adolescents requiring a targeted sexual health education program or intervention. Strategies for these individuals or groups can then be tailored accordingly.

## 1.4. Study scope

This research assessed the attitudes, intentions and behaviours of a school-based sample of adolescents living in Perth, Western Australia. In addition to this sample, a cluster sample of female youth from antenatal and pregnancy termination clinics was also used. Participants were aged 12 to 19 years. Males were sampled from the school population only and so the number of males reporting a personal history of adolescent pregnancy (resulting in either an abortion or live birth) was negligible.

Independent and dependent variables were gathered from self-report data only, and were limited to what had already been collected in a previous research project. There was no opportunity to reassess the participants and the re-evaluation of findings with another sample was outside the scope of this project.

The original research project, entitled the “Teen Relationships Study,” which provided the raw data for this doctoral research, did not seek to apply the Rasch Unidimensional Measurement Model in the construction of its psychometric scales. Whilst not ideal, it is not uncommon for the Rasch Model to be applied retrospectively to data sets (O'Connor, 2004). It is possible that more beneficial scales could have been developed had the Rasch measurement paradigm and its model been implemented in the very first stages of scale development and testing.

Although the scope was limited by these factors, the unique nature of the sample and its subject matter ensures this study makes a significant contribution to the science of adolescents’ attitudes, intentions and behaviours.

## 1.5. Organisation of the thesis

This thesis contains seven chapters.

This first chapter summarises the current context in which the research took place along with the perceived problem to be investigated. This issue resulted in the development of a set of research objectives. The scope of the research was also recognised in this chapter.

Chapter Two reviews the current literature relating to the sexual health of Australians, with particular emphasis on adolescent issues. The concept of attitude as a protective and modifiable factor is explored, along with an investigation of how attitude concepts are currently implemented in sexual health education programs. The chapter concludes with an explanation of how researchers commonly attempt to measure attitude constructs. The Rasch Unidimensional Measurement Model is introduced at this stage, with an explanation of how application of the model can produce unidimensional and invariant measurement scale scores.

Chapter Three summarises the methodology and method of this research project. It starts with a reiteration of the research problem and research questions. Explanations of sampling, instrumentation and data analysis are made.

Chapters Four, Five and Six detail development of the abortion, adolescent parenthood and contraception scales respectively. Each chapter begins with an explanation of the scale development process, including the steps taken to modify the scales. Utilising the newly developed scale, the second part of each chapter explains the statistical analyses undertaken. These analyses sought to describe (a) the prevalence of particular attitudes or intentions, (b) if individuals engaging in RSB hold different attitudes or intentions to their peers, and (c) the association between scale scores and RSB when considering other individual, familial and extrafamilial factors.

Chapter Seven provides an overall discussion of the main findings. It concludes by discussing the study limitations, implications for current practice and making suggestions for future research.

## CHAPTER 2

### *Review of Related Literature*

## 2.0. Overview

This chapter reviews the conceptual issues relevant to the research presented in this thesis. Due to the sample population utilised in this project, Australian and Western Australian issues are reviewed where possible and placed in an international context. In instances where literature is scarce, research from other developed nations has been sourced.

This review examines research into the sexual health and behaviour of adolescents; with specific attention given to the role attitudes play and how researchers may measure these constructs. It is presented in four sections. Part one provides background information into sexual health as a public health issue, with a specific focus on explaining why it needs to remain on the Australian public health agenda. Because adolescents are often considered a priority group for sexual health initiatives, the second section details the current state of adolescent sexual health in Australia and other developed nations; the relative contribution of attitudes in the formation of sexual behaviours and their presence in various sexual health programs is also discussed. Part three provides a summary of attitudinal concepts, their role in psychosocial theories, and an explanation of how researchers have previously attempted to associate attitude with behaviour. Finally, as this review strives to illustrate the importance of attitudes in sexual health initiatives, the last section provides background information into how researchers have attempted to measure attitude constructs. This section also provides a detailed explanation of the modern measurement paradigm and technique known as the Rasch Unidimensional Measurement Model. Application of this model can enable psychosocial measures such as attitude to be produced with the level of rigor expected of physical measures such as length, weight and time.

## 2.1. Literature review part one: Sexual health as an Australian public health issue

Concepts of sexual and reproductive health have been variously defined by international parties in recent decades, reflecting an evolution in the understanding of these terms. Whilst sexual health was once incorporated as part of reproductive health, it is now considered an important issue in its own right (O'Rourke, 2008). The current working definition of sexual health was developed through collaboration between the World Health Organization (WHO) and the World Association of Sexology (WAS), and exists as follows:

*Sexual health is a state of physical, emotional, mental and social well-being in relation to sexuality; it is not merely the absence of disease, dysfunction or infirmity. Sexual health requires a positive and respectful approach to sexuality and sexual relationships, as well as the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination and violence. For sexual health to be attained and maintained, the sexual rights of all persons must be respected, protected and fulfilled (World Health Organization, 2006 p.5).*

The toll taken on people's health by the pandemic of Human Immunodeficiency Virus (HIV), other sexually transmitted infections (STIs), unwanted pregnancies, unsafe abortion, infertility, sexual abuse, sexual dysfunction and discrimination on the basis of sexual orientation has been amply documented and highlighted in national and international studies over the past three decades (World Health Organization, 2006). At the same time there has been significant advancement in knowledge about sexual function and sexual behaviour, and their inextricable link to physical and emotional health (Brody, 2010; Gianotten, Whipple, & Owens, 2007; Office of the Surgeon General, 2001; Whipple, 2008; Whipple, Koch, Moglia, Owens, & Samuels, 2003). There has also been the development of new contraceptive technologies, medications for sexual dysfunction, and more holistic approaches to the provision of family planning and other reproductive health care services (World Health Organization, 2006).

Although the sexual and reproductive health of people in developed nations such as Australia is far superior to those from poorer countries, unacceptably high levels of ill health still exist, especially across several population groups (Glasier et al., 2006; O'Rourke, 2008). The current sexual and reproductive health of Australians across several key areas shall now be summarised.

### 2.1.1 The sexual health of Australians

Utilising key findings from the *Australian Study of Health and Relationships* (ASHR) and other contemporary public health data, a brief summary of Australian sexual issues is outlined. The ASHR was a computer-assisted telephone survey administered during 2001 and 2002 to a stratified sample of the Australian population. The survey was completed by 19,307 respondents aged 16-59 years and, to date, is the only national sex survey to have been undertaken in Australia (A. M. A. Smith, Rissel, Richters, Grulich, & de Visser, 2003c). A second iteration of the study is currently underway (Australian Government, Australian Institute of Family Studies, 2013).

#### Sexual diversity

The majority of Australians (97.4% of males, 97.7% of females) identify themselves as heterosexual (A. M. A. Smith, Rissel, Richters, Grulich, & de Visser, 2003b). However, utilising the same stratified sample, same-sex attraction or homosexual experience was reported by 8.6% of men and 15.1% of women, indicating a notable level of discord (A. M. A. Smith, Rissel, et al., 2003b). As the normative behaviours and related health issues for same-sex attracted individuals are inherently different to that of heterosexuals (Pitts, Smith, Mitchell, & Patel, 2006) and because this doctoral research focuses on heterosexual behaviour, same-sex behaviour is not further addressed in this review of the literature.

#### Age of sexual commencement and premarital sex

The age at which Australians first engage in vaginal intercourse has steadily declined in Australia over the past 50 years (A. M. A. Smith, Rissel, Richters, Grulich, & de Visser, 2005). Amongst Australian men aged 50-59 years, the median age for first experiences of vaginal intercourse was 18 years, and lowers to 16 years for those currently aged 16-19 years. For women, the age of commencement had also declined from 19 years of age to 16 years across the same two age brackets (Rissel, Richters, Grulich, de Visser, & Smith, 2003b). This steady decline in age of first sexual experience is consistent with trends in other industrialised countries (Johnson et al., 2001; Turner, Danella, & Rogers, 1995; Wellings et al., 2006). Age of first sexual intercourse in a population of contemporary young people underestimates sexual behaviour, as other forms of sexual activity commonly occur before the first experience of intercourse (A. M. A. Smith et al., 2005).

For many countries worldwide, the average time spent between first sexual experience and settling with a marital or de facto partner remains stable. However, in countries such as Australia and Britain, there has been a clear increase in the number of years people spend

being sexually active prior to marriage; with a consequent increase in the number of lifetime partners (Wellings et al., 2006).

#### Use of condoms and contraceptives

Contraceptive use amongst Australian women appears to be high. The ASHR reported that 70.8% of female respondents were using a method of contraception and when a selective sample was taken to include only women exposed to the risk of pregnancy, contraceptive use increased to 94.8% (i.e. respondents were excluded from the overall sample if they reported no male partners in the previous year, were not having vaginal intercourse, were postmenopausal, pregnant, were trying to get pregnant and/or were infertile or had a partner that was infertile) (Richters, Grulich, de Visser, Smith, & Rissel, 2003). The most common forms of contraception reported by women were the oral contraceptive pill (33.6%), tubal ligation or hysterectomy (22.5%), condom (21.4%) or vasectomy in the male partner (19.3%); with respondents moving from reversible to permanent methods as they aged (Richters et al., 2003). Some methods were used simultaneously and some individuals switched between methods (Richters et al., 2003).

Amongst all sexually active respondents with heterosexual experience, 90.4% of males and 84.0% of females reported that they had used condoms at some time. However, only 42.5% of males and 34.2% of females had used condoms in the past year and only 21.2% of adults had used them during their most recent experience of vaginal intercourse (de Visser, Smith, Rissel, Richters, & Grulich, 2003b). Consistent condom use in the past six months was least likely amongst live-in regular partners, more likely amongst non-live-in regular partners and most likely with casual sexual partners (de Visser et al., 2003b).

#### Unwanted sexual activity

Within Australia, experiences of sexual coercion have been reported by 4.8% of men and 21.1% of women, with just over half these events occurring when the individual was aged 16 years or younger (de Visser, Smith, Rissel, Richters, & Grulich, 2003a). Individuals reporting sexual coercion were more likely to smoke, be more anxious about sex, report greater incidences of psychosocial distress and STI, and not speak to anyone about their experience (de Visser et al., 2003a).

#### Fertility and infertility

During 2012 there were 309,582 registered births in Australia. This translates to a total fertility of 1.93 babies per woman over her reproductive lifetime, although Indigenous women exhibit a higher fertility rate of 2.71 babies per woman. The median age of all



mothers who gave birth was 30.7 years and for fathers was 33.0 years. In this recording period 35% of all births were to parents not in a registered marriage (Australian Bureau of Statistics, 2013).

Throughout Australia, each state and territory has different laws regarding access to lawful abortion services. Most of the variation relates to the reason for the abortion, the requirements needed prior to accessing an abortion and the gestational age (de Crespigny & Savulescu, 2004). Within Western Australia, abortion is legal up to 20 weeks provided the woman has given informed consent. Furthermore, there are guidelines in place for a woman who is not able to consent to treatment. Additional restrictions are also in place for women under 16 years of age and for anyone wishing to terminate a pregnancy beyond 20 weeks (Government of Western Australia, 2007).

Current national data on pregnancies that don't result in a live birth are known to be inaccurate due to different reporting legislations across states and territories (Hutchinson, Joyce, & Cheong, 2013; H. Williams & Davidson, 2004). However, unofficial estimates place the national abortion rate at around 18 per 1,000 women (Sedgh, Singh, Henshaw, & Bankole, 2011). This is higher than several other developed nations with more liberal abortion laws (Sedgh et al., 2011). From the ASHR, a representative sample of Australian women aged 16-59 years found that of those who had ever been pregnant, 33.4% reported a miscarriage, 22.6% reported having terminated a pregnancy and 2.6% reported a stillbirth (A. M. A. Smith, Rissel, Richters, Grulich, & de Visser, 2003a). Within Western Australia, where abortion notification is mandatory, the abortion rate in 2012 was 16.4 per 1,000 women of reproductive age (compared to a birth rate of 64.8 per 1,000 women), equating to 8,429 abortions during this period (Hutchinson et al., 2013).

Despite increasing birth rates, one in six couples has experienced fertility problems (A. M. A. Smith, Rissel, et al., 2003a). The dominant cause of infertility has been attributed to male factors in up to 30% of couples, female factors in up to 37% of couples, and both male and female in 20 to 35% of cases (Boyle, Vlahos, & Jarow, 2004).

#### Sexually transmissible infections

Sexually transmissible infections (STIs) are a common experience amongst sexually active Australians, with 20.2% of men and 16.9% of women reporting a lifetime diagnosis (Grulich, de Visser, Smith, Rissel, & Richters, 2003). The true incidence of STIs within Australia is difficult to ascertain as many sufferers may be asymptomatic and only some infections

require mandatory notification by health professionals; with this requirement differing across states and territories (Australian Government, 2010a).

Chlamydia is the most common bacterial STI in developed countries and the most frequently notified infection across all Australian states and territories (Australian Government, 2010a). The disease is most prevalent amongst heterosexuals and those of Aboriginal or Torres Strait Islander (ATSI) descent (Australian Government, 2010a). However, it is important to note that any notification figures will not accurately reflect the true incidence of chlamydia, as the disease is asymptomatic in up to 75% of females and 50% of males (Centers for Disease Control and Prevention, 2000).

In 2012, the age standardised notification rate in Australia was 364.0 per 100,000 population (Government of Western Australian, 2012). The age standardised notification rate in Western Australia during this same period was 502.0 per 100,000 population which was the second highest in Australia behind the Northern Territory (1099.0 per 100,000 population) (Government of Western Australian, 2012). The number of chlamydia notifications in Western Australia increased more than three-fold from 2003 (n=3,761) to 2012 (n=11,845); with 83% of chlamydia notifications in 2012 occurring in people aged under 30 years (Government of Western Australian, 2012).

Whilst chlamydia is effectively treated with single dose antibiotics, if left untreated the infection can cause acute inflammation of reproductive tracts in both males and females (e.g. cervicitis, urethritis); with such conditions leading to complications such as pelvic inflammatory disease, tubal infertility, ectopic pregnancy and chronic pelvic pain in females (World Health Organization, 2007). Indeed, untreated chlamydial infection is a major cause of infertility worldwide (World Health Organization, 2007).

Gonorrhoea and syphilis are two additional bacterial STIs that require mandatory notification in Australia. Within Western Australia, they currently exhibit age standardised notification rates of 90.6 and 3.3 per 100,000 population respectively (Government of Western Australian, 2012). In 2012, there were approximately 2,103 notifications of gonorrhoea and 188 notifications of syphilis (Government of Western Australian, 2012). These diseases are most prevalent amongst geographically isolated ATSI and homosexually active men (Australian Government, 2010a).

Whilst hepatitis, or inflammation of the liver, can be caused by a number of different viruses (e.g. hepatitis A, hepatitis B, hepatitis C) it is hepatitis B that is most easily transmitted through unprotected sexual activity and chronic hepatitis B may lead to

cirrhosis or liver cancer (World Health Organization, 2007). Between 1991 and 2005, there have been over 90,000 people diagnosed with chronic hepatitis B in Australia (O'Sullivan et al., 2004). In 2012, 23 incident cases of newly acquired hepatitis B and 662 notifications of hepatitis B (unspecified) were reported in Western Australia (Government of Western Australian, 2012). The age standardised notification rate for newly acquired hepatitis B within Western Australia is currently 0.8 per 100,000 population (Government of Western Australian, 2012). The majority of sufferers are migrants, ATSI, people participating in high risk sexual activity and people who inject drugs (O'Sullivan et al., 2004).

Genital herpes and human papilloma virus (HPV) are viral STIs, commonly found in the Australian population but are not subject to notification procedures (Australian Government, 2010a). Genital herpes infections, caused by herpes simplex virus type 2, affect 12% of adult Australians and can cause significant psychological and physical morbidity to those with the infection (Australian Government, 2005). Once infection occurs, individuals may develop episodic genital ulcers that can vary greatly in frequency and severity. A range of antiviral agents are available to manage the infection, although it will always remain in the body (Australian Government, 2010a).

HPV is the most common STI in developed countries (Baseman & Koutsky, 2005) and although it is not notifiable, it is about twice as common as chlamydia in most sexual health centres (Australian Government, 2010a). Research from a college population in the United States indicated that nearly 50% of females acquired HPV within three years of sexual commencement (Winer et al., 2003). Dependent on genotype, HPV can lead to the development of genital warts and cervical cancer (Skinner & Hickey, 2003), although most sufferers will be asymptomatic (Australian Government, 2010a).

Finally, Australia's response to Human Immunodeficiency Virus (HIV) is recognised globally as a success, with national HIV prevalence lower than most other comparable countries (Australian Government, 2010b). Over time, HIV weakens the immune system so that it can no longer overcome infections or illnesses. When a person contracts two HIV-related illnesses simultaneously, in combination with a low white blood cell count, they are diagnosed with Acquired Immunodeficiency Syndrome (AIDS) that will ultimately lead to death (Australian Government, 2010b). However, within Australia the number of HIV cases converting to AIDS diagnoses has stabilised in the past decade (National Centre in HIV Epidemiology and Clinical Research, 2009) due to the availability of effective antiretroviral therapies which can reduce the mortality and morbidity of the infection.

As at 31 December 2008, 28,330 diagnoses of HIV infection (995 in the previous year), 10,348 diagnoses of AIDS and 6,765 deaths following AIDS had occurred in Australia; with an estimated 17,444 people still living with HIV infection (National Centre in HIV Epidemiology and Clinical Research, 2009). The age standardised notification rate of new HIV diagnoses in Australia is 4.7 per 100,000 population (National Centre in HIV Epidemiology and Clinical Research, 2009). In Western Australia, this equates to a rate of 3.4 per 100,000 population (National Centre in HIV Epidemiology and Clinical Research, 2009). There were 121 HIV infections notified in Western Australia in 2012 (Government of Western Australian, 2012).

### 2.1.2 Sexual health priority groups

Collaboration between the Public Health Association of Australia, the Sexual Health & Family Planning Association of Australia and the Australian Reproductive Health Alliance identified that, within Australia, the following groups were disproportionately affected by sexual and reproductive ill health:

- adolescents and young people;
- Indigenous people;
- people with disabilities;
- people living in rural and remote areas;
- people from culturally and linguistically diverse backgrounds, including refugees;
- same-sex attracted, gay, lesbian, bisexual, transgender and intersex people;
- sex workers;
- people in prison; and
- homeless people. (O'Rourke, 2008 p. 13)

Such health inequalities are due to various social determinants such as income, employment, housing, education and access to community resources (O'Rourke, 2008). Similarly, attitudes are considered an essential component in the achievement of positive sexual and reproductive health outcomes. A review of sexuality education policies and programs across Europe demonstrated that the best sexual and reproductive health outcomes are found in countries with egalitarian attitudes about sexuality. Such attitudes are reflected in popular culture, laws, policies and programs that respect, protect and fulfil sexual and reproductive rights (IPPF European Network, 2006).

In the second section of this chapter, sexual health outcomes for one specific population group – the Australian adolescent – is explored in greater detail. This additional insight endeavours to illustrate why adolescents and young people continue to be listed as a priority group for sexual health initiatives.

## **2.2. Literature review part two: The sexual health of Australian adolescents**

### **2.2.1 Adolescent sexual health as a multifaceted issue**

Sexual development is a normal aspect of adolescence, and whilst it is an area of increased focus worldwide, some academics believe that Australia has failed to prioritise sexual and reproductive health on the public health agenda to the same degree as other governments (O'Rourke, 2008; H. Williams & Davidson, 2004). Adolescent developmental pathways, sexual behaviour and risk are complex notions influenced by a multitude of factors such as gender, race, ethnicity, geography and socioeconomic status; and are further shaped by the traditions and values of the individual's community (Marston & King, 2006; Wellings et al., 2006).

Efforts to understand adolescent sexual development and behaviour is warranted in light of the high proportion of adverse sexual health outcomes for this age group. Adolescents are unduly affected by the negative outcomes of unwanted sex, early pregnancy and STIs, which impact the health of people in their second decade of life more than any other age group (Bearinger et al., 2007; Glasier et al., 2006; O'Rourke, 2008). Similarly, the health care needs of adolescents have changed in recent decades due to a reduction in the age of first sexual experience and coincident later age of marriage and childbearing (Bearinger et al., 2007; Wellings et al., 2006).

### **2.2.2 The sexual behaviour of Australian adolescents**

The Australian Research Centre in Sex, Health and Society (ARCSHS) national sexual health survey of secondary students provides the most comprehensive data relating to the sexual health issues of Australian youth. It has documented changes in sexual health-related knowledge, attitudes and practices amongst adolescents since 1992. Data from 2013 reveal that of the secondary students sampled, most had experienced some form of sexual activity such as deep kissing (67.8%), genital touching (52.1%) or oral sex (39.0%); with 22.7% of year 10 students (median age 15 years), 34.3% of year 11 students (median age 16 years) and 50.4% of year 12 students (median age 17 years) indicating that they had engaged in sexual intercourse (Mitchell et al., 2014).

The sexual behaviour and subsequent public health considerations for ATSI youth specifically will not be covered in this review of the literature. Unique factors affect this population group, and within Western Australia, have led to the development of specialised strategies (Government of Western Australian, 2011).

### **2.2.3 Adverse sexual health outcomes**

As most young people in Australia now experience 10 to 20 years of sexual activity before committing to a life partner, this phenomenon increases their risk for a range of adverse outcomes including unwanted sexual activity, STIs and unplanned pregnancy (O'Rourke, 2008). To further exacerbate this risk, adolescent relationships also tend to be shorter in duration than adult relationships, coupled with a shorter duration between sexual partnerships (Kraut-Becher & Aral, 2003). It is because such adverse outcomes occur at higher rates than those seen in adult populations, that adolescents are often viewed as a priority population for sexual health initiatives.

#### Unwanted sexual activity

The prevalence of unwanted sexual activity is a commonly ignored public health issue. From the ASHR, a nationally representative survey of Australians aged 16-59 years indicated that 2.8% of men and 10.3% of women reported being sexually coerced during childhood (up to and including the age of 16 years) (de Visser et al., 2003a). The most recent ARCSHS study of secondary students indicated that amongst all students who had engaged in sexual intercourse, 25.0% recalled an instance when this sexual activity had been unwanted (Mitchell et al., 2014). Feeling pressure from one's sexual partner or being intoxicated by alcohol were the most common reasons cited for these unwanted encounters (Mitchell et al., 2014). When asked to consider the last time they had engaged in sexual intercourse, 5.2% of males and 8.0% of females indicated that this had been unwanted (Mitchell et al., 2014). Specific Western Australian data relating to rates of unwanted or coerced sex have not been reported.

#### Sexually transmissible infections (STIs)

A significant proportion of the burden of STIs is concentrated in young people worldwide (Skinner, Parsons, Kang, Williams, & Fairley, 2007). In Australia, the most recent National STI Strategy identifies young people as a priority population (Australian Government, 2010a); and chlamydia, HPV and genital herpes are identified as the most important STIs for this population (Skinner et al., 2007).

Within Western Australian during 2012, the 15-19 year age group accounted for 26% of all chlamydia notifications throughout the year, with female notifications greater than males up to the age of 25 years (Government of Western Australian, 2012). Due to differences in cervical biology (Simms & Stephenson, 2000), adolescents are at greater risk of developing pelvic inflammatory disease from a chlamydia infection than adults; which may result in tubal infertility, chronic pelvic pain and ectopic pregnancy (Skinner & Hickey, 2003).

Epidemiological measures related to HPV and genital herpes, for Australian adolescents, are difficult to obtain as the sufferer may be asymptomatic and these infections do not require mandatory notification. However, researchers indicate that they are the two most common STIs within the country (Harrison, 2009) and that youth commonly suffer from these infections (Australian Government, 2010a; Cunningham et al., 2006). Within Australia, a national government-funded HPV vaccination program commenced in 2007 for female adolescents and was extended to both sexes in 2012. This has already resulted in notable reductions in cases of genital warts (Liu, Donovan, Brotherton, Saville, & Kaldor, 2014) and cervical cytological abnormalities (Brotherton et al., 2011; Tabrizi et al., 2012).

Skinner et al. (2007) outline a variety of factors to help explain why adolescents are at risk of an STI. Issues such as the early commencement of sexual activity, the normative developmental processes of adolescents (including a propensity for risk taking and impulsivity), relationship dynamics (which are often shorter in duration and faster in turnover than adults), use of alcohol, inadequate knowledge surrounding STIs, poor methods of risk perception and a preference for hormonal contraceptive methods in longer term relationships can all increase the likelihood of an STI (Skinner et al., 2007). These factors, in addition to failed contraception, can also increase the likelihood of an unplanned pregnancy.

### Pregnancy

Australia's adolescent fertility rate (births to women aged 15-19 years) is currently 16.1 per 1,000 adolescent females per year (Australian Bureau of Statistics, 2013). It has been highlighted as one of the highest adolescent fertility rates of a developed nation outside of the United States of America and the United Kingdom (Singh & Darroch, 2000; van der Klis, Westenberg, Chan, Dekker, & Keane, 2002). More importantly, in contrast to other developed countries, more than 50% of adolescent conceptions within Australia result in abortion (United Nations Children's Fund, 2001; van der Klis et al., 2002). This statistic illustrates that sexually active adolescents rely heavily on the ability to access legalised



abortion to deal with an unwanted pregnancy, meaning that a simple comparison of teenage fertility statistics between nations underestimates the true extent of the issue of unplanned adolescent conceptions in Australia (H. Williams & Davidson, 2004).

From a Western Australian perspective, during 2012 there were 1,119 abortions to females aged 19 years or younger, with abortion and birth rates of 14.4 and 17.1 per 1,000 adolescent women per year respectively (Hutchinson et al., 2013). Overall, 45.8% of adolescent conceptions within the state resulted in an abortion (Hutchinson et al., 2013). Unlike most other states and territories in Australia, Western Australian figures are based on actual case numbers due to its legislated abortion notification system, although miscarriages and stillbirths are not included in these calculations (Hutchinson et al., 2013).

Extensive literature, both internationally and within Australia, has documented poorer outcomes for adolescent mothers and their children (Bai, Wong, & Stewart, 1999; Chen et al., 2007; Hoffman, 1999; Kirby, 2007; O'Rourke, 2008; van der Klis et al., 2002; H. Williams, Kang, & Skinner, 2013). Adolescent mothers are more likely to be Indigenous, come from a disadvantaged background, live in rural areas, smoke, use substances, have lower educational achievement and be exposed to domestic violence (H. Williams et al., 2013). During pregnancy they are more likely to smoke, use substances and experience urogenital infections; they access antenatal care at lower rates, have poorer birth outcomes and their children have higher rates of hospitalisation as infants and beyond (O'Rourke, 2008; H. Williams et al., 2013). After pregnancy adolescent mothers are less likely to attend tertiary education, more likely to have large families and more likely to be single; hence increasing the likelihood that they and their children will live in poverty (Kirby, 2007). Some adolescents plan their pregnancies and seek motherhood to gain adult status and a sense of fulfilment (Condon, Donovan, & Corkindale, 2001b; Hanna, 2001; Quinlivan, 2004; J. Smith, Skinner, & Fenwick, 2012), although a greater proportion are due to ambivalence towards pregnancy, resulting in less consistent and less effective contraceptive use (Condon & Corkindale, 2002; J. Smith, Skinner, et al., 2012).

The children of adolescent mothers are at greater risk of prematurity, low birth weight and neonatal death (L. Lewis, Hickey, Doherty, & Skinner, 2009). During childhood and adolescence they are more likely to experience neglect or abuse, perform poorly at school, experience emotional or behavioural problems (with higher incarceration rates for boys) and engage in risky sexual behaviour (RSB); perpetuating an intergenerational cycle of adolescent childbearing and its associated problems (Kirby, 2007; L. Lewis et al., 2009; Maynard, 1997; Meade, Kershaw, & Ickovics, 2008; O'Rourke, 2008).

Data on outcomes for adolescent females who choose to terminate a pregnancy is limited. New Zealand research determined that, in comparison with young women who became pregnant before age 21 and continued with their pregnancy, females who chose to terminate their pregnancies had higher levels of subsequent educational achievement (Fergusson, Boden, & Horwood, 2007). Other research has identified depression in young people post abortion (Cogle, Reardon, & Coleman, 2003).

Literature on the fathers in an adolescent pregnancy is particularly restricted. Whilst a systematic literature review has investigated adolescent male attitudes towards pregnancy occurrence and pregnancy outcomes (Lohan, Cruise, O'Halloran, Alderdice, & Hyde, 2010), most studies ignore the male partner in an adolescent abortion. Internationally, research is often limited to the level of support males may or may not provide in the postpartum period (Wiemann, Rickert, Berenson, & Volk, 2005) or the role they play in contraceptive choices (Hogben et al., 2006; Sieving, Bearinger, Resnick, Pettingell, & Skay, 2007; J. Smith, Fenwick, Skinner, Merriman, & Hallett, 2011; Tschann, Adler, Millstein, Gurvey, & Ellen, 2002).

## 2.2.4 Risky sexual behaviour

The high incidence of unwanted sexual activity, STI and pregnancy amongst Australian adolescents is associated with their involvement in any number of risky sexual behaviours (RSBs). Definitions of RSB can differ widely, making the comparison of research findings difficult. Some researchers fail to explicitly define the specific behaviours they constitute as risky and the dependent variables used to measure such behaviour can vary.

For the purpose of this review and research, risky sexual behaviours (RSBs) are those that place an individual at greater risk of an unplanned pregnancy or STI. These behaviours shall include commencement of sexual activity at an early age, failure to consistently and correctly use condoms or other contraceptives<sup>1</sup>, a history of multiple sex partners, sexual activity whilst under the influence of drugs and/or alcohol, or an unwanted sexual encounter. Each of these behaviours has been linked with the adverse outcomes of unplanned pregnancy or STI across multiple studies and in a diverse range of populations.

### Commencement of sexual activity at an early age

Most Australian high school students from year 10 onwards are sexually active in some way (Mitchell et al., 2014). The age at first vaginal intercourse has been falling in Australia, with

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<sup>1</sup> The term contraception or contraceptives shall collectively include both barrier and hormonal methods.

the current median age being 16 years compared with 18 and 19 years in older age Australian cohorts (Rissel et al., 2003b).

Adolescents aged 15 years or younger are less likely to display the developmental readiness to engage in sensible sexual decision making (Peterson & Crockett, 1992). Like many behaviours that reflect the transition from childhood to adulthood, sexual activity that is ill-timed or out of step with developmental needs may be detrimental to the psychological, emotional and social wellbeing of the adolescent (Moore & Rosenthal, 2006).

A longitudinal study of urban adolescents of colour in the United States demonstrated that sexual activity at age 15 years or younger was more problematic than sexual activity initiated in later adolescence, as youth who initiated intercourse early were more likely to engage in unprotected sex and report multiple sexual partners (C. Smith, 1997). A national study of Swedish adolescents established that females who commenced sexual activity before the age of 15 years were more like to report multiple sexual partners, participate in sexual intercourse on a first date, engage in oral or anal sex and make an allegation of sexual abuse (Edgards, 2000). Australian research has shown early age of sexual debut is associated with a greater number of lifetime and recent sexual partners, in addition to an increased risk of STI (Rissel et al., 2003b).

#### Failure to consistently and correctly use condoms or other contraceptives

Whilst condoms have been demonstrated to effectively reduce the risk of many STIs if used consistently and appropriately (National Institute of Allergy and Infectious Diseases, 2001), 52.1% of sexually active Australian secondary students report inconsistent condom use (Mitchell et al., 2014). Although condoms are more likely to be used by adolescents in new relationships, their use may decline as early as three weeks into a relationship (Fortenberry, Tu, Harezlak, Katz, & Orr, 2002).

Adolescents may also rely on less effective methods of contraception. At their last sexual encounter, 15.3% of secondary students relied upon withdrawal and 3.5% had utilised the morning after pill (Mitchell et al., 2014). Dual methods (condoms plus hormonal contraception) have only been reported by 17% of sexually active Australian adolescents (Agius, Pitts, Dyson, Mitchell, & Smith, 2006).

A study to assess the contraceptive behaviour in a purposive sample of sexually active Australian females determined that whilst participants were familiar with various contraceptive options, many used it inconsistently. Adolescents' commitment or lack of commitment to prevent pregnancy was influenced by their attitudes toward adolescent

pregnancy, their personal perception of pregnancy risk and an appraisal of the benefits of utilising contraception; with the status of their sexual relationship an additional mediating factor (Skinner et al., 2009).

#### Multiple sex partners

A history of multiple sex partners increases risk of STI (Ericksen & Trocki, 1992; Luster & Small, 1994; Skinner et al., 2007) and pregnancy (Luster & Small, 1994). The concern is not the high level of sexual activity that can result, but that multiple partnerships are coupled with unprotected intercourse or inconsistent use of condoms (Moore & Rosenthal, 2006).

Amongst sexually active Australian secondary students in 2013, 16.0% reported two sexual partners in the previous year and 23.2% reported three or more sexual partners (Mitchell et al., 2014).

#### Alcohol, other drugs and sexual activity

Kotchick, Shaffer and Forehand (2001) cite several worldwide studies that document the link between substance use and risky sexual practices. Such practices included multiple sexual partners, inconsistent condom use and early sexual debut; with correlations found amongst adolescents who used such substances in their everyday life, in addition to those who used them either immediately prior to, or during sexual encounters (Kotchick et al., 2001). In the most recent ARCSHS survey of Australian high school students, 20.7% of males and 14.6% of females reported that they had been drunk or high during their last sexual encounter (Mitchell et al., 2014).

Whilst repeated cross-sectional studies have shown a gradual decline in the prevalence of alcohol, tobacco and illicit drug use by Australian secondary students, incidence rates for these substances are still high (White & Bariola, 2012). At age 14, around 74% of students had tried alcohol; and by age 17, 59.3% reported drinking in the month prior to survey (White & Bariola, 2012). Amongst current drinkers (those who reported alcohol consumption in the week prior to the survey), 18.5% of 17 year olds were drinking at levels in excess of Australian Alcohol Guidelines (White & Bariola, 2012). Amongst students aged 17 years, 42.1% had a history of smoking cigarettes and 14.5% had smoked cigarettes in the past week (White & Bariola, 2012). Across all ages (12-17 years) other illicit drug use included inhalants (17.3%), tranquilisers (17.1%), cannabis (14.8%), hallucinogens (3.0%), amphetamines (2.9%), ecstasy (2.7%), steroids (2.0%), cocaine (1.7%) and opiates (1.6%) (White & Bariola, 2012).

### Unwanted sexual encounter

Altered cognition after sexual abuse may cause victims to appraise RSBs more positively (D. W. Smith, Davis, & Fricker-Elhai, 2004). After controlling for potentially confounding demographics and risk behaviours, several studies have documented an association between unwanted sexual encounters and the RSBs already outlined: early sexual debut (Brener, McMahon, Warren, & Douglas, 1999; Silverman, Raj, Mucci, & Hathaway, 2001), unprotected sexual intercourse (Choi, Binson, Adelson, & Catania, 1998; Homma, Wang, Saewyc, & Kishor, 2012; Silverman et al., 2001), multiple sex partners (Brener et al., 1999; Choi et al., 1998; Homma et al., 2012; Silverman et al., 2001) and sexual activity whilst under the influence of alcohol or other drugs (Brener et al., 1999; Silverman et al., 2001). Unwanted sexual activity has also been positively associated with an increased risk for pregnancy (Homma et al., 2012; Silverman et al., 2001) or contracting an STI (Choi et al., 1998; de Visser et al., 2003a). Most studies cited were from North America and relied upon either adolescent or undergraduate samples.

## **2.2.5 Strategies to reduce risky sexual behaviour in adolescents**

Any intervention that seeks to combat health issue may be classified based upon the point of implementation and its intended target group. This includes any intervention seeking to avoid or minimise RSBs, or interventions hoping to reduce unplanned pregnancy or STI rates.

Traditionally, interventions that seek to prevent or minimise various health issues have been classified from a temporal perspective (Caplan, 1964). Primary prevention occurs prior to onset and seeks to reduce the likelihood of an issue occurring; secondary prevention is implemented once problems have been identified but before they become severe; and tertiary prevention seeks to minimise the burden of a health issue and to prevent relapse (Caplan, 1964).

Mrazek and Haggerty (1994) introduced a subsequent model that delineates specific target groups. They placed interventions on a spectrum ranging from prevention and early intervention, through to treatment and maintenance. Within prevention interventions, approaches may be universal, selective or indicated. Universal prevention targets the general public, selective prevention targets sub-groups whose risk for a certain disorder or health issue is higher than for the general population and indicated prevention is targeted

at individuals or sub-groups at who are at high risk or who display early warning signs or symptoms relating to the health issue (Mrazek & Haggerty, 1994). Within the context of adolescent sexual health, examples of prevention interventions may include sexual health education in schools (universal), peer education programs for ATSI youth (selective) and tailored programs for adolescents participating in risky sexual activity (indicated).

Whilst prevention strategies seeking to address sexual health issues can be broad in nature; focusing on structural determinants of positive health through policy direction and the creation of supportive environments, they can also adopt a more focused approach by targeting high risk groups or individuals (Egger, Spark, Lawson, & Donovan, 1999). Each approach has merit and a successful program will incorporate a variety of strategies according to the appropriateness of the situation (Egger et al., 1999).

A review of studies within the United States, that attempted to reduce sexual risk-taking amongst adolescents, determined that programs may solely target abstinence or may be more comprehensive; supporting abstinence in addition to the use of condoms and contraceptives for sexually active adolescents (Kirby, 2007). These more comprehensive programs targeted issues such as reducing the number of sexual partners, avoiding concurrent partners (and people who have concurrent partners), increasing the time between sexual partners, testing for and treating STIs, vaccinating against HPV and hepatitis B, and male circumcision (Kirby, 2007). Within The Netherlands, the country considered by many to be the leader in the field of adolescent sexual health, the focus is often broader; incorporating additional strategies like wide-ranging and easy access to sexual health services and contraception, integrated and comprehensive education from early childhood, and community-driven harm minimisation initiatives (H. Williams & Davidson, 2004). Efforts by Australia fit somewhere in the middle (Mitchell, 2005), with many local researchers calling for efforts to be strengthened (Mitchell, 2005; Skinner & Hickey, 2003; Skinner et al., 2007; H. Williams & Davidson, 2004) and health agencies issuing a joint call to action for a national sexual and reproductive health strategy (O'Rourke, 2008).

Whilst a vast number of policies and strategies in Australia currently address particular aspects of sexual and reproductive health, many are not consistent with current best practice (O'Rourke, 2008). They are criticised for focusing on single issues (e.g. STIs, indigenous health), not addressing the social determinants of sexual health and failing to link with inter-dependent strategies (e.g. mental health with sexual health) (O'Rourke, 2008). Efforts are also hampered by legislation which varies throughout states and

territories, data collection that is not comprehensive and a sex education curricula that is inconsistently delivered throughout secondary schools (Mitchell et al., 2011; O'Rourke, 2008; Skinner & Hickey, 2003; A. M. A. Smith et al., 2011; H. Williams & Davidson, 2004).

#### Addressing risk and protective factors

Through an understanding of the significant factors that relate to sexual behaviour, those working with adolescents are able to identify individuals most likely to engage in RSB. Strategies can then be implemented to address the modifiable factors, with the aim to elicit positive behaviour change. An appreciation of the risk and protective factors also ensures scarce health resources are prudently distributed.

A school-based survey of Australian adolescents in Victoria, comprehensively assessed a range of factors shown in longitudinal research to predict common psychosocial health problems in adolescents (e.g. deliberate self-harm, substance use, anti-social behaviour, depressive symptoms) (L. Bond, Thomas, Toumbourou, Patton, & Catalano, 2000). Whilst not specifically concerned with sexual health issues, the "Adolescent Health and Wellbeing Survey" indicated that many problems share common risk and protective factors, with good reason to believe that effective interventions could have a positive impact on other health areas, such as sexual health (L. Bond et al., 2000). These factors extended over multiple domains: community, family, school and peer/individual (L. Bond et al., 2000).

Investigations in the United States have also helped to identify sexual risk and protective factors affecting adolescents. Four key factors were identified: race and ethnicity, socioeconomic status, social influences and attitudes towards contraception, condoms and pregnancy along with safer-sex behavioural skills (Kalmuss, Davidson, Cohall, Laraque, & Cassell, 2003).

Through a review of more than 400 peer-reviewed studies conducted in the United States, Kirby and Lepore (2007) identified more than 500 risk and protective factors that influence one or more of the following adolescent issues: their sexual behaviour (i.e. commencement of sex, frequency of sex, number of sexual partners, use of condoms, use of other contraception), risk of pregnancy, risk of childbearing or risk of an STI (Kirby & Lepore, 2007). The wide array of factors fell into one of four themes:

- biological factors such as age, physical maturity and sex;
- disadvantage or dysfunction in the lives of adolescents and their families, peers and communities;

- sexual values and norms expressed or modelled by adolescents themselves or by their families, romantic partners, peers, religious groups, schools and communities; and
- adolescents' connection to groups or institutions that discourage RSB, encourage responsible behaviour, or both.

Such risk and protective factors may be sexual or non-sexual in nature, with Kirby and Lepore (2007) surmising that prevention programs have successfully targeted both types of factors, as well as a combination of the two. Programs may strive to strengthen the protective factors, minimise the risk factors or address both issues concurrently. However, of all the known risk and protective factors, adolescents' own sexual beliefs, values, attitudes and intentions were found to be the most strongly related to sexual behaviour and the most amenable to change by pregnancy and STI prevention programs (Kirby, 2007; Kirby & Lepore, 2007).

Kirby and Lepore (2007) then went further to specifically identify the most important attitudes, values, beliefs and intentions. A permissive attitude towards premarital sex was considered a significant and important risk factor for RSB. In contrast, numerous attitudes were identified as particularly significant protective factors. Most surrounded attitudes towards condoms and contraception and is probably a reflection on the vast number of studies that have been conducted in this area. Such protective attitudes included a positive attitude towards condoms and other forms of contraception, a greater intention and motivation to use contraception and the belief that condoms do not reduce sexual pleasure (Kirby & Lepore, 2007).

Although this comprehensive review provides great insight into risk and protective factors for adolescents, effort still needs to be made to determine if such factors can be translated to population groups outside of the United States.

#### Characteristics of effective strategies

A targeted and multi-faceted approach is now recommended for interventions aimed at individuals or groups. DiClemente's (2008) review of focused literature advocates a tailored approach to sexual health interventions, developed specifically towards the *needs of particular sub-groups* and based on a *sound theoretical framework*; with other reviews sharing similar viewpoints. Bearinger et al. (2007) contend that for adolescents, programs should be mindful of the unique developmental needs of the age group and to the lived experience of the individual. Similarly, a worldwide review of youth sex education



programs reported that the most successful initiatives were based on an established theory of behaviour change (e.g. Social Learning Theory, Theory of Planned Behaviour, Health Belief Model) and that in most instances the particular psychosocial mediating factors to be changed were identified (Kirby, Laris, & Rolleri, 2007). There was strong evidence that such programs had positive effects on key psychosocial constructs (i.e. knowledge, risk perception, values and attitudes, intentions) (Kirby et al., 2007). Finally, Kirby's (2002) review of interventions to impact sexual behaviour, contraceptive use, pregnancy and/or childbearing amongst adolescents in the United States and Canada, concluded that successful programs are: (1) modelled on established theories of health-related behaviour, (2) target multiple behavioural outcomes and (3) address both sexual and non-sexual antecedents of sexual risk taking.

The findings from this systematic review, along with an understanding of the most important risk and protective factors, strongly advocates that any program striving to minimise RSB is based on an established psychosocial theory. Similarly, whilst a variety of factors could be addressed (e.g. peers, community, family, media); focusing on the beliefs, values, attitudes and intentions of adolescents has been identified as a critical component. The degree to which Australia manages to incorporate attitude concepts in its sexual health curricula is now outlined.

### **2.2.6 The use of attitude in Australian sex education settings**

Whilst sexual health initiatives may be directed at individual, group or population levels; and can utilise a variety of settings and intervention types (Kang, Skinner, & Usherwood, 2010); this review will focus on written curricula that have been developed for school settings. Such programs, or components of them, may also be utilised by community groups. Along with internet websites, parents and friends; the school sexual health program is the most common source of sexual health information for Australian secondary students and 45.0% of students consider it to be "*very*" or "*extremely*" relevant (Mitchell et al., 2014).

This directed approach omits initiatives such as media campaigns, health policies or clinic-patient protocols, and programs that target adolescents not attending formal education or community programs (e.g. homeless youth). Similarly, this review does not cover curricula designed for special population groups (e.g. culturally and linguistically diverse students,

ATSI students or students with disabilities). This review aims to provide a brief background into sexual health programs that mainstream Australian youth are exposed to; and the prevalence and implementation of attitude concepts in such programs.

#### Sexual health curricula in Australian schools

Sexual health education in schools was first formalised in New South Wales in 1967 when it was included in the health syllabus; with all other states and territories quickly adopting similar programs (M. Lewis, 1998). This was followed three decades later by a national framework for sexual health education funded by the Australian Government Department of Health and Ageing. *Talking Sexual Health: National Framework for Education about HIV/AIDS, STIs and Blood-Borne Viruses in Secondary Schools* (1999) was endorsed by all states and territories, and was subsequently supported with a professional development manual (Ollis & Mitchell, 2001) and parents' booklet (Jones, Mitchell, & Walsh, 1999). All states and territories, excluding Queensland, offered in-service teacher training as part of the implementation of these materials (Mitchell & Walsh, 2009).

State health departments funded local resources to be developed within the Talking Sexual Health guidelines. These include *Growing and Developing Healthy Relationships* in Western Australia (Government of Western Australia, 2002a, 2002b, 2002c), *Catching On* in Victoria (State Government of Victoria, 2004) and the *Teach it Like It Is 2* materials in South Australia (SHine SA, 2011).

As part of a much broader effort to develop a national curriculum for all subject areas, a Health and Physical Activity curriculum has recently been developed for use throughout Australia (Australian Curriculum, 2014). Whilst it is still awaiting final endorsement, the curriculum is currently available for use by schools. Based on the version that has been tabled, all state-based sexual health resources could continue to be utilised and would adhere to the guidelines of this national curriculum.

#### The concept of attitude within Australian sexual health curricula

The *Talking Sexual Health* guidelines advocate programs that go beyond the dissemination of information to contextualise issues and provide students with situational skills. This approach enables students to make informed personal choices based on their own values' structure; and strives to increase knowledge retention by recommending classroom activities that encourage students to reflect on their own and others' feeling and attitudes (Australian Research Centre in Sex, 1999). All state-developed resources incorporate this recommendation and provide an extensive collection of values clarification activities

(Government of Western Australia, 2002a; SHine SA, 2011; State Government of Victoria, 2004).

Within Western Australia (until the national curriculum is approved) all curriculum policy for students up to year 12 is directed by the School Curriculum and Standards Authority (Government of Western Australia, School Curriculum and Standards Authority, 2013a), formerly known as the Curriculum Council. Their guidelines for the provision of health and physical activity detail the knowledge, understandings, skills, values and attitudes that students should exhibit across different phases of development (Curriculum Council, 1998). Teachers are directed to evaluate the beliefs and attitudes of students towards particular issues or situations (including sexual health) through simple open ended questionnaires, observations and attitudinal surveys. They assert that “*strong (attitudinal) responses may provide further opportunities for teaching and learning activities such as discussion of more appropriate behaviours*” (Curriculum Council, 1998, p. 139).

The Western Australian Department of Health also has guiding principles for the provision of sexual health education within the state. In addition to a wide range of other directives, these principles encourage programs to include strategies that explore values, attitudes and behaviours at all levels: the individual, and society and the various communities within it (Government of Western Australia, 2003).

The *Growing and Developing Healthy Relationships* resource adheres closely to the *Talking Sexual Health* guidelines, in addition to both policy documents put forward by the Curriculum Council and Western Australian Department of Health. At each learning phase, from early childhood to middle adolescence (the program only currently extends to year 10), the resource details specific attitudes and values for students to develop. A broad range of strategies and learning activities are provided to help students develop an awareness of their own attitudes and to become cognisant of the attitudes of their peers. Ongoing professional development is available for teachers throughout the state, and this has recently been supported by an interactive website to provide on-line support for educators (Government of Western Australia, Department of Health, Department of Education, 2013). Notably, within Western Australia, sexual health education is not mandated for year 11 and 12 students. Students in upper school may elect to study a health course that may or may not incorporate sexual health (Government of Western Australia, School Curriculum and Standards Authority, 2013b).

Whilst current guidelines strongly emphasise the importance of developing positive sexual health attitudes, their significance has been marginalised in the national curriculum that has recently been tabled (Australian Curriculum, 2014). Specific health issues (e.g. STIs) and attitude concepts (e.g. attitudes towards condoms) are not detailed, and the merits of this curriculum have been debated in the media (702 ABC Sydney, 2013; McNeilage, 2013). Although state-based resources and guidelines continue to emphasise the importance of attitudes, it is possible that this aspect of sexual health education could be de-emphasised going forward, by educators adhering strictly to the new national curriculum.

#### Effectiveness of sexual health curricula

Despite the provision of high-quality curricula resources based on best-practice principles and a number of guidelines, policies and recommendations outlined by both health and education authorities; the absence of minimum standards has led to wide variability in the delivery and quality of sexuality education delivered in Australian schools (O'Rourke, 2008). The design, planning, quality, implementation and effectiveness of comprehensive sexuality education in Australia is impeded by numerous factors such as marginalisation of the subject area, vague curriculum guidelines, limited teacher training and wavering departmental support for staffing, funding, timetabling and material resources (Goldman, 2010; Mitchell et al., 2011).

Within Australia, most teachers lack formal qualifications in sexuality education, are concerned about parental and community reactions, seldom attend professional development in the area and do not feel confident to teach many aspects of sexuality education (Mitchell et al., 2011; Ollis, 2009; Rosenthal, Haste, Mitchell, & Ollis, 2002; A. M. A. Smith et al., 2011).

A national survey of over 200 secondary school teachers determined that mandated learning outcomes were being met in very limited ways due to limitations in the professional skills of teachers, lack of availability of (up to date) resources, and an already crowded curriculum (A. M. A. Smith et al., 2011). Teachers reported that current programs were only somewhat effective in helping students to explain and clarify their feelings, values and attitudes (A. M. A. Smith et al., 2011). It is important to note that this survey only included teachers who self-identified as sexuality educators, meaning schools or teachers who did not deliver any sexuality education were not targeted.

The Western Australian Department of Health undertook a state-wide consultation with youth to ascertain where and how young people currently receive their sexual health

education and from where and how they would like to receive it. The majority of young people expressed frustration at school-based sexual health education that covered only basic subjects areas such as puberty, pregnancy, contraception and STIs (Sorenson & Brown, 2007). In a similar consultation with parents throughout the state, regarding their attitudes towards sexual health education in schools, a key finding was that parents wanted educators to *“remain sensitive to the diversity of values among their students and their families”* (Dyson, 2010, p. 5).

An audit of the uptake of the *Growing and Developing Healthy Relationships* materials in Western Australian schools (government and independent) indicated that the resource was not used as widely as hoped. Whilst awareness of the resource was high (74% of surveyed schools new about the materials), only 44% of schools across the state appeared to use the materials (Growing & developing healthy relationships: Audit of the uptake of the curriculum support materials in WA schools, 2006).

Based upon a consultation with Western Australian youth, a series of recommendations were made that included:

- ensuring sexual health education is identified as a core component of school health promotion obligations,
- increasing support for the professional development of teachers,
- prioritising school policies that support the implementation of sexual health curricula and collaborate with local youth health services, and
- ensuring resources are allocated to support the continued development and evaluation of youth-centred sexual health education models (Sorenson & Brown, 2007).

A case study that addresses many of these issues is currently being undertaken in Geelong, Australia (Ollis, Harrison, & Richardson, 2012).

Within the context of teaching values and attitudes, it has been suggested that teachers become comfortable with their own sexuality before addressing the issues that students face or may wish to discuss (Ollis, Harrison, & Maharaj, 2013). A pre-service training program for sexuality education teachers has recently been developed to strengthen the capacity of teachers to provide comprehensive sexuality education, with a strong focus on exploring personal values and attitudes (Ollis et al., 2013). It is believed to be the first education program of its type within Australia and possibly worldwide (Deakin University, 2013).

Therefore, despite understanding the enormous influence values, attitudes and beliefs can have on behaviour, it appears that many educators continue to limit sexuality education to the simple dissemination of information. Perhaps through greater appreciation of attitude concepts, specific data relating to the sexual health attitudes of Australian adolescents and implementation of the initiatives as outlined by Sorenson and Brown (2007), teachers may achieve more positive educational and public health outcomes.

An explanation of attitude concepts and their place in various psychosocial theories is now provided.

## 2.3 Literature review part three: The role of attitudes in the sexual health of adolescents

### 2.3.1 Conceptual distinctions

The terms *belief*, *value*, *attitude* and *intention* each come with their own respective definitions and a strong presence in social science literature. Researchers will often analyse these constructs concurrently or use the terms interchangeably. For the purpose of this research project, the word attitude will be used as a hyponym for belief, value, attitude or intention statements unless otherwise expressly indicated.

#### Attitude

Since the beginning of systematic research in social psychology, the concept of attitude has been decidedly paramount (Eagly & Chaiken, 1993). As is common with many fundamental principles, a variety of definitions have developed over time, although Eagly and Chaiken (1993) provide perhaps the most contemporary description, defining an attitude as “*a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour*” (p.1). Attitudes can be directed towards a variety of animate and inanimate entities such as an object, person, institution or event.

As it cannot be directly observed, an attitude is generally acknowledged as a hypothetical construct or latent variable that can only be inferred from measurable responses reflecting evaluation of the attitude object (Ajzen, 2005). Based upon the work of numerous predecessors, Rosenberg and Hovland (1960) delineated the concept of attitude by classifying these evaluations as either verbal or nonverbal, and differentiated between three separate and qualitatively distinct components of attitude: cognition, affect and conation (now more commonly termed behaviour). This classification is depicted in Figure 2.1. Cognitive responses reflect perceptions of the object or beliefs concerning its likely characteristics; affective responses reveal the individual’s evaluations and feelings; whilst a conative or behavioural response indicates how a person would act with respect to the object (Rosenberg & Hovland, 1960). Fishbein and Ajzen (1975) termed cognitive responses *beliefs*, affective responses *attitudes* and behavioural responses *intentions*, helping to explain how these terms are commonly interchanged.

		RESPONSE CATEGORY		
		Cognition	Affect	Conation
RESPONSE MODE	Verbal	<i>Expressions of beliefs about attitude object</i>	<i>Expressions of feelings toward attitude object</i>	<i>Expressions of behavioural intentions</i>
	Nonverbal	<i>Perceptual reaction to attitude object</i>	<i>Physiological reactions to attitude object</i>	<i>Overt behaviours with respect to attitude object</i>

Figure 2.1. Responses used to infer attitudes (adapted from Rosenberg & Hovland, 1960, p. 3).

The tripartite division of evaluative responses has a long history in social psychological discussions of attitude, with most debate focused on trying to ascertain the discriminate validity of these three components (Eagly & Chaiken, 1993). Contemporary viewpoints now support the concept that evaluation of the attitude object can be manifested through responses of all three types: cognitive, affective and behavioural; regardless of whether the types prove separable in appropriate statistical analyses (Eagly & Chaiken, 1993).

#### Beliefs and values

A belief is a proposition or premise held as true by an individual (Morgan & King, 1971), and as previously explained, is the *cognitive response* an individual has towards an object leading to the formation of an attitude (Fishbein & Ajzen, 1975). In contrast, a value is defined as “the judgement that a person places on the desirability, worth or utility of obtaining some outcome” (B. Adams & Bromley, 1998 p. 94). Figure 2.2 provides an example of how these two constructs interact, namely that beliefs can be translated into attitudes through values.

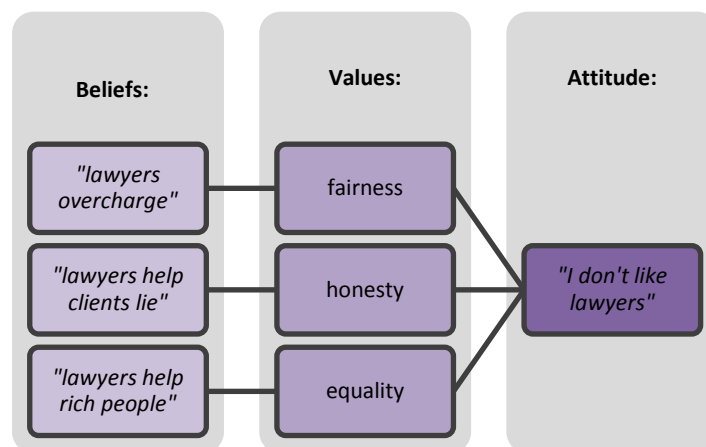


Figure 2.2. Example of how beliefs and values interrelate to create an attitude (adapted from Krosnick & Milburn, 1990, p. 51).



### Intentions

An intention refers to a person's subjective probability that they will perform a given behaviour, and as previously explained, is the *behavioural response* an individual has towards an object leading to the formation of an attitude (Fishbein & Ajzen, 1975).

## **2.3.2 The concept of attitude in biopsychosocial theories**

Despite efforts to widely educate individuals about positive health behaviour, many people fail to follow recommended practices; causing health researchers who seek to address this disparity to closely investigate human behaviour (Ajzen & Manstead, 2007). Social scientists have developed a wide variety of biopsychosocial theories to help explain the causal antecedents of different behaviours. Examples include the Health Belief Model (Becker & Maiman, 1975), Protection Motivation theory (Rogers, 1975), Social Learning theory (Bandura, 1977), the Theory of Reasoned Action (Ajzen & Fishbein, 1980) and the Theory of Planned Behaviour (Ajzen, 1991). These theories and models have been utilised in a vast array of health-related interventions that strive to change behaviour; addressing anything from improving nutrition and physical activity habits through to minimising undesirable sexual behaviour (Egger et al., 1999).

Belief, value, attitude and intention concepts feature prominently in these theories. The models try to explain the health behaviours of people by exploring their beliefs about the behaviour and its consequences, the seriousness of the health risk and the perceived threat to the individual (B. Adams & Bromley, 1998); and suggest that an individual's decision to engage in a particular behaviour can often be attributed back to their attitude towards the behaviour (Deptula, Henry, Shoeny, & Slavick, 2006).

### The Theory of Planned Behaviour

One of the most commonly used conceptual frameworks currently used to investigate the determinants of particular behaviours is provided by the Theory of Planned Behaviour (Ajzen, 1991). This theory has been used successfully in efforts to better understand a diverse range of health-related behaviours such as exercising, smoking cessation, adherence to a low-fat diet, testicular self-examination, donating blood, using condoms, wearing a safety helmet and many others (Armitage & Conner, 2001).

Briefly, according to the Theory of Planned Behaviour, human action is influenced by three major factors: a favourable or unfavourable evaluation of the behaviour (attitude towards

the behaviour), perceived social pressure to perform or not perform the behaviour (subjective norm) and perceived capability to perform the behaviour (perceived behavioural control). In combination, these factors lead to the formation of a behavioural intention. In general, the more favourable the attitude and subjective norm, and the greater the perceived behavioural control, the stronger the intention of the person to perform the behaviour in question. Finally, given a sufficient degree of actual control over the behaviour, people are expected to carry out their intentions when the opportunity arises (Ajzen & Manstead, 2007). The Theory of Planned Behaviour (Figure 2.3), is now one of the most popular models for the prediction of behaviour, with the concepts of attitude and intention considered to be key components (Ajzen & Gilbert Cote, 2008).

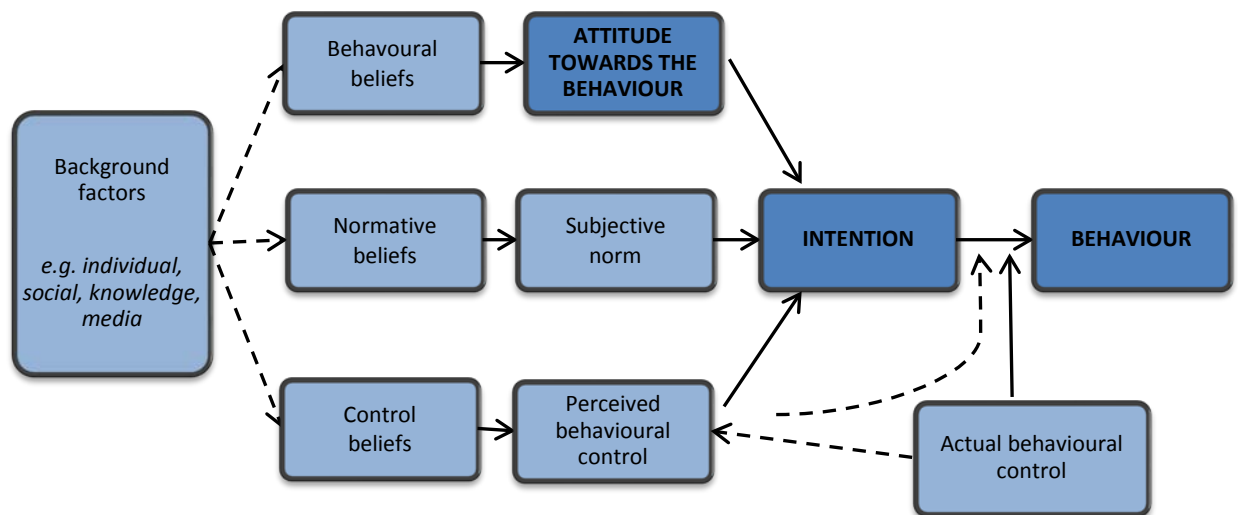


Figure 2.3. Theory of Planned Behaviour (adapted from Ajzen & Fishbein, 2005, p. 194).

### 2.3.3 The association between attitude and behaviour

Attitudes have always been linked to efforts to understand behaviour, with the earliest of social psychologists assuming that human behaviour was guided by social attitudes (Ajzen & Fishbein, 2005). Studies on the linkage between attitude and behaviour flourished in the late sixties but the results failed to support the cause-effect relationship (Ajzen & Fishbein, 2005; Eagly & Chaiken, 1993) and some researchers called for abandonment of the attitude construct (Wicker, 1969).

To some extent, with greater understanding of the complex association between these constructs and by employing models of aggregation and compatibility (Eagly & Chaiken, 1993), researchers have been able to produce relatively high correlations between a

general attitude and behaviour. As general attitudes are typically poor predictors of single behaviours, aggregation requires that the behaviour criterion is broad (e.g. the behaviour *“consistent use of condoms”* is more desirable than *“used condoms at last sexual encounter”*). Similarly, compatibility requires that if researchers wish to measure a specific behaviour, the measures of attitude and behaviour should be congruent, involving the same action, target, context and time elements, for significant positive correlations to be found (Ajzen & Fishbein, 2005).

Finally, ineffective measurement techniques have also been put forward as a possible reason for the inability to successfully link attitude with behaviour (Ajzen & Fishbein, 2005; Eagly & Chaiken, 1993). The final section of this literature review details how social scientists have commonly attempted to measure attitude constructs and details an alternative technique that may be more effective in linking attitude with behaviour.

### **2.3.4 Adolescent sexual health attitudes and relationship with behaviour**

Within the context of adolescent sexual health, Kirby and Lepore (2007) developed a causal structure illustrating the risk and protective factors that affect adolescent pregnancy and STI; explaining the relationship between psychosocial constructs and health outcomes (Figure 2.4). Values and attitudes regarding sex, condoms, contraception, pregnancy etc., in addition to other proximal individual factors (e.g. knowledge about sexual topics, self-efficacy) will influence intentions to have sex and intentions to do so safely. They also influence the attainment of skills to resist sex and to use condoms and contraception. Intentions and skills will subsequently influence behaviours such as abstinence, frequency of sex, number of sexual partners, use of contraception and use of condoms; which in turn influences risk for pregnancy and STI. Additional individual and environmental factors are also involved (Kirby & Lepore, 2007).

Focus will now turn to the previous attitudinal research that has been undertaken with adolescents. Specifically, studies that have investigated adolescent attitudes towards abortion, adolescent parenthood and contraception shall be reported; including any known associations between attitudes and behaviour.

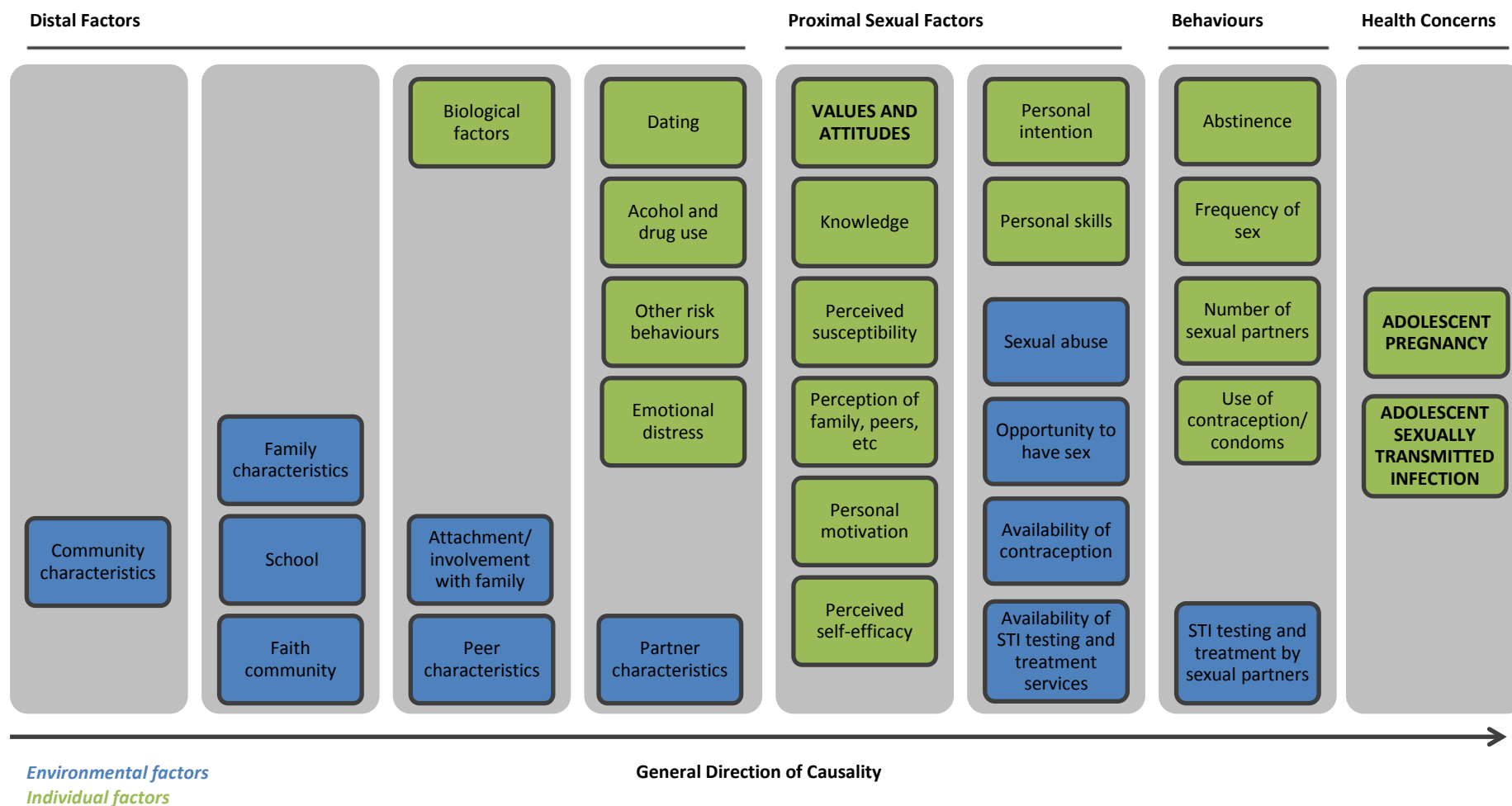


Figure 2.4. A possible causal structure among risk and protective factors affecting adolescent pregnancy and sexually transmitted infection (adapted from Kirby & Lepore, 2007, p. 27)

### Adolescent attitudes towards abortion and association with behaviour

Most research into attitudes towards abortion has utilised overseas college and young adult samples (J. W. Bryan & Freed, 1993; Carlton, Nelson, & Coleman, 2000; Esposito & Basow, 1995; Hollis & Morris, 1992; Misra & Hohman, 2000; Notzer, Levran, Mashiach, & Soffer, 1984; Stets & Leik, 1993; L. S. Wright & Rogers, 1987) rather than adolescents. Whilst studies determined that young adults generally supported abortion (Carlton et al., 2000; Hollis & Morris, 1992; Misra & Hohman, 2000; L. S. Wright & Rogers, 1987), this support has shown to both increase (Esposito & Basow, 1995) and decrease (L. S. Wright & Rogers, 1987) with age. Males have shown more support in some studies (J. W. Bryan & Freed, 1993; Misra & Hohman, 2000; L. S. Wright & Rogers, 1987) and gender has been reported as insignificant in others (Carlton et al., 2000; Esposito & Basow, 1995). Sexual activity has been associated with greater support for abortion (J. W. Bryan & Freed, 1993) and individuals with a personal experience of abortion were generally more supportive (J. W. Bryan & Freed, 1993; Carlton et al., 2000; Hollis & Morris, 1992; L. S. Wright & Rogers, 1987). Religion has been repeatedly associated with negative support for abortion (J. W. Bryan & Freed, 1993; Esposito & Basow, 1995; Misra & Hohman, 2000; Notzer et al., 1984; Stets & Leik, 1993; L. S. Wright & Rogers, 1987).

When adolescent samples have been used, teenagers have generally demonstrated support for abortion (Boggett & Bradner, 2000) that increases with age (Ku, Sonenstein, & Lindberg, 1998). Abortion attitudes have been associated with male adolescent attitudes towards pregnancy and pregnancy resolution (Lohan et al., 2010). For female adolescents, abortion attitudes have been associated with how they intend to (Brazzell & Acock, 1988) or actually resolve (Eisen, Zellman, Leibowitz, Chow, & Evans, 1983; Frost & Oslak, 1998; Zabin, Astone, & Emerson, 1993) an unplanned pregnancy.

Few studies have described abortion attitudes amongst Australian adolescents. A cross-sectional, nationally representative study reported that males and females aged 16-19 years were significantly more likely than older Australians to believe that abortion was always wrong, but differences across ages were small (Rissel, Richters, Grulich, de Visser, & Smith, 2003a).

Only a few studies have quantified the contribution of various factors in the formation of abortion attitude. Misra and Hohman (2000) attributed 23.0% of the variance in abortion attitudes to the following factors (in hierarchical order): attendance at church (14.0%), political views (4.2%), number of children present at home, social class, strength of religious

affiliation, views of life, place of residence, number of persons in the household and size of the home community. Wang and Buffalo (2004) stated that 15.0% of the variance in abortion attitudes could be explained by education, gender-role attitudes, fundamentalist beliefs and childbearing motivations.

#### Adolescent attitudes towards adolescent parenthood and association with behaviour

Most studies investigating adolescent attitudes towards early parenting have used American samples (Brückner, Martin, & Bearman, 2004; Davies et al., 2004; Jaccard, Dodge, & Dittus, 2003; Kalmuss et al., 2003; Kelly, Lesser, & Paper, 2008; Marsiglio, 1993; Rosengard, Phipps, Adler, & Ellen, 2005). Frequently, adolescent parenting attitudes have been positively linked with subsequent childbearing (Jaccard et al., 2003; Kalmuss et al., 2003; Zabin, Hirsch, & Boscia, 1990; Zabin, Sedivy, & Emerson, 1994). However, regression analyses attempting to quantify the influence of various predictors on early parenting attitudes have reported minimal influence (Brückner et al., 2004; Davies et al., 2004; Jaccard et al., 2003).

In the United States, Jaccard et al. (2003) used a prospective research design to observe the relationship between initial pregnancy attitudes and the occurrence of a pregnancy in the ensuing 12 months. A nationally representative, school-based sample of female adolescents was used. More positive attitudes towards adolescent parenting were held by females who were older, had a mother with lower educational attainment, lived in a single-parent home and who were currently in a romantic relationship (Jaccard et al., 2003). Additional research using only sexually active females from the same sample determined no association between pregnancy attitudes and subsequent pregnancy (Brückner et al., 2004). However, adolescent females with ambivalent pregnancy attitudes were less likely to practice contraception than peers who did not support early parenting (Brückner et al., 2004).

Adolescent attitudes towards early parenting have also been investigated within specific female sub-groups. African American adolescent females who desired pregnancy were more likely to report sexual activity with a casual partner, a regular sexual partner who was at least five years older than them or the inconsistent use of contraception (Davies et al., 2004). Female adolescents in a juvenile detention centre were more likely to desire pregnancy if they had previously been pregnant (Kelly et al., 2008).

Amongst adolescent males, attitudes toward pregnancy have been associated with neighbourhood quality, parental education level, race and attitudes surrounding

masculinity (Marsiglio, 1993). Attitudes towards pregnancy have been strongly linked with pregnancy intention (Rosengard et al., 2005) and previous fatherhood (Kelly et al., 2008).

Research within Australia has determined that some adolescents idealise pregnancy and parenthood (Condon et al., 2001b; Quinlivan, 2004), with males exhibiting higher degrees of idealisation (Condon et al., 2001b). A significant proportion of adolescent pregnancies have also been attributed to these beliefs, rather than by accident or negative attitudes towards contraception (Condon, Donovan, & Corkindale, 2001a). Qualitative analyses with sexually active female adolescents has uncovered polarising themes of “*life-line*” and “*life-derailment*” in relation to adolescent parenting (J. Smith, Skinner, et al., 2012).

#### Adolescent attitudes towards contraception and association with behaviour

Amongst adolescents, attitudes towards contraception have been consistently and positively linked with intention to use contraception (Adler, Kegeles, Irwin Jr, & Wibbelsman, 1990; Basen-Engquist & Parcel, 1992; Brown, DiClemente, & Park, 1992; Brückner et al., 2004; Crosby, Salazar, & DiClemente, 2004; Hogben et al., 2006; R. Wang, Cheng, & Chou, 2008; R. Wang, Hsu, & Wang, 2004), actual condom use (Basen-Engquist & Parcel, 1992; Baumer & South, 2001; A. Bryan, Rocheleau, Robbins, & Hutchison, 2005; Hingson, Strunin, Berlin, & Heeren, 1990; Kingree & Betz, 2003; Kingree, Braithwaite, & Woodring, 2000; Lescano, Vazquez, Brown, Litvin, & Pugatch, 2006; Magura & Shapiro, 1994; Marsiglio, 1993; Reitman et al., 1996; Robertson, Stein, & Baird-Thomas, 2006) and actual contraceptive use (Brückner et al., 2004; Holmbeck, Crossman, Wandrei, & Gasiewski, 1994; Marsiglio, 1993; Sieving et al., 2007; Weisman et al., 1991; Zabin et al., 1993). More positive attitudes towards contraception have been reported amongst sexually active adolescents (Holmbeck et al., 1994) and females (Holmbeck et al., 1994; Robertson et al., 2006; R. Wang et al., 2008; Zhou et al., 2012). The vast majority of these adolescent studies were based in the United States.

Despite numerous research linking contraceptive attitudes with behaviour, few studies have examined factors influencing the formation of positive attitudes. Based on the Theory of Reasoned Action (Ajzen & Fishbein, 1980), researchers confirmed that adolescents’ general attitudes towards four specific contraceptive methods reflected their beliefs about the consequences of using the method and the values they ascribed to these consequences (Adler et al., 1990). A study with adolescent males in Taiwan determined that contraceptive attitude, better contraceptive self-efficacy, no prior sexual experience, higher perception of peers’ contraceptive behaviour and higher perception of support from significant others

were important predictors of higher contraceptive intention (R. Wang et al., 2004). Finally, high self-esteem has been positively correlated with attitudes towards contraception (Holmbeck et al., 1994).

There appears to have been no specific research attempting to quantify the contraceptive attitudes of Australian adolescents. The most recent national survey of Australian secondary students contained no questions relating to attitude (Mitchell et al., 2014). However, qualitative studies have provided insight into why contraceptive attitudes may be poor. Single-sex focus groups with ATSI adolescents uncovered themes such as reputation, coercion, reduced desire in relation to contraceptive use (Larkins et al., 2007). Interviews with adolescent females linked attitudes towards contraception with attitudes towards adolescent pregnancy and a personal appraisal of pregnancy risk (Skinner et al., 2009; J. Smith, Skinner, & Fenwick, 2011). Interviews with young males determined that attitudes towards contraception formed in the context of risk avoidance or assumed safety, and a lack of consequential thought; with some discourses in regret (J. Smith, Fenwick, et al., 2012; J. Smith, J. Fenwick, et al., 2011).

### 2.3.5 The measurement of attitudes

Whilst researchers may measure attitudes using indirect methods such as covert observation or assessing physiological responses, more direct methods are often easier to conduct and the results have proven to be just as valid (Ajzen & Fishbein, 2005). Some undisguised measures have even performed better than disguised measures (Kidder & Campbell, 1970). When adopting a direct measurement approach, questionnaires that utilise a Likert scale or semantic differentials are the most common. In Kirby and Lepore's (2007) systematic review, the studies that assessed attitudes towards condoms and other forms of contraception all used similar methods. Participants answered a set of items most commonly through self-report questionnaires, although personal interviews and telephone surveys were also conducted. Response categories were offered on a Likert scale, with answers either summed or averaged to produce a final attitude score. Resultant scores were subjected to various statistical analyses (e.g. bivariate or multivariate analyses) dependent on the aims of the study and the other documented variables.

The process of creating a measurement scale from the final score was not often documented, although in some instances the Cronbach's alpha statistics, indicating the internal consistency or reliability of the scales, were mentioned. One researcher commented that it was *"disappointing that the poor scaling properties of (the items used)*



*limit their value as measures of attitudes, but they are the only available national data dealing with (this) issue” (Marsiglio, 1993, p. 24).*

Such a process may enable attitudes to be ranked by intensity and can highlight the attitudes that more highly correlate with the other study variables under investigation. However, any difference between attitude items or overall person scores is arbitrary. Focus will now turn to a psychometric measurement technique that can address these shortfalls by creating invariant and linear measures of attitude.

## 2.4 Literature review part four: Use of the Rasch model to measure attitude constructs

The final section of this literature review details a modern measurement model which can be used to calibrate assessments of attitude and attitude change over time. This technique, known as the Rasch Unidimensional Measurement Model (Rasch, 1960/1980), has been increasingly adopted by the social sciences but is still an underutilised approach. Before describing this model in detail, a description of how social scientists have previously attempted to measure attitude constructs, and comparisons with techniques used in the physical sciences is provided.

### 2.4.1 Measurement in the physical sciences

To measure a particular quantitative property in the physical sciences, such as distance, weight or time, the magnitude of the property is expressed relative to a particular unit of measure (e.g. meters, kilograms, minutes). These units of measurement are *objective abstractions* that exist on a continuum of *equal intervals* (T. G. Bond & Fox, 2001).

To use weight as an example, the units of measurement (e.g. grams, pounds) are *abstractions* due to their intangible nature. Wright provides a clear example of this:

*When we read our weight as 180 pounds, we take that number not as a one-time, local description of a particular step onto this particular scale but as our approximate weight right now, just before now, and, inferentially, for a useful time to come* (B. D. Wright, 1997, p. 34).

Weight is also a construct that has been obtained *objectively*, meaning the final value is not governed by the person taking the measurement or the items being weighed. Irrespective of who takes the measurement or the equipment being used, the weight of the object will remain stable. Similarly, the same scale can be used to weigh a variety of different items, each with the same level of accuracy. This feature, whereby the process is resistant to variation, is known as invariance.

Finally, the units used to quantify weight exist on an *equal interval scale*. Such equal units are either infinitely divisible or conjointly additive in nature (B. D. Wright, 1997) and can therefore be used in basic mathematical equations to infer quantifiable differences in mass. For example, if objects A and B have weights of 30g and 300g respectively, object B is ten

times heavier than A, they differ in mass by 270g and have a combined weight 330g. The stability of the unit also means that inferences can be made about missing data. If, using the previous example, we know that  $A + B = C$  or  $30g + 300g = 330g$ , any two known weights can be utilised to ascertain a third unknown weight (e.g.  $B = C - A$ ).

## 2.4.2 Measurement in the social sciences

Whilst the construction of invariant measures such as weight, distance, temperature and time has enabled physical scientists to conduct statistical analyses that can investigate relations amongst measures and test hypotheses, in contrast, many social scientists have not applied the same level of rigor when creating psychosocial measures (T. G. Bond & Fox, 2001). In many instances the unobservable phenomena social scientists strive to measure, such as intelligence, personality and attitude, are referred to as latent traits or variables because they are not able to be known or measured directly. Commonly these constructs are measured by asking respondents to respond to a set of items comprising a scale; where the questions or items (or a subset of them) will elicit data pertaining to one trait or construct. For an attitude scale, a set of items may be administered to help to establish the strength or direction of one's attitude towards an entity.

A number of measurement techniques, mostly using questionnaires, have been developed to collect data on attitudes. These include Guttman scales, Thurstone scales, Likert scales and Semantic Differentials (Coaley, 2010). Traditionally, the techniques used to analyse the data collected were derived from Classical Test Theory (Michell, 1999); an approach centred on the concept that an observed score is the sum of a true score and a measurement error term. Constructs such as ability or attitude are measured by summing individual responses to questionnaire items to derive a total score. In more complex examples, items may be differentially weighted. For data analysis, criteria for the final selection of items are based on internal consistency checks, with the best discriminating items selected to constitute the scale (Dawis, 1987). This may employ a technique such as Factor Analysis, which aims to describe response variability in terms of underlying dimensions in the data referred to as factors. Whilst an individual's performance on a scale is assumed to be a measure of their ability or the strength of their attitude, it is important to note that the difficulty of the task or the difficulty in endorsing an item is not quantified in this approach.

In providing a strong argument that social sciences should strive to achieve objective measurement, Bond and Fox (2001) state that “... *psychometricians, behavioural*

*statisticians, and their like conduct research as if the mere assignment of numerical values to objects suffices as scientific measurement”* (p. 2). In many instances, the social scientist will often treat raw scores and the summation of such scores as measures of a construct; utilising them in statistical analyses without first ensuring they are a replicable and meaningful set of measures.

Michell (1999) provides a detailed historical account of how and why the physical sciences and social sciences, specifically psychology, have each pursued different approaches to measurement; advising psychologists to exercise caution when promoting their methods as quantitative science. Social scientists for example, may view a score of ‘4’ on a Likert scale to be twice that implied by a score of ‘2’. These responses are scores and should not, at this stage, be viewed as measures of construct. Wright and Linacre (1989) define a measure as *“a number with which arithmetic (and linear statistics) can be done, a number which can be added and subtracted, even multiplied and divided, and yet with results that maintain their numerical meaning”* (p. 2). Bond and Fox (2001) believe that the goal of the social scientist should be to *“create abstractions that transcend the raw data, just as in the physical sciences, so that inferences can be made about constructs rather than mere descriptions about raw data”* (p. 3).

Wright and Masters (1981) identified seven measurement criteria necessary to construct a scale from question or item responses, which will measure a variable in accordance with theoretical requirements for measurement. Many of these criteria are also criteria for invariance. Such a psychometric method must:

- i. evaluate each item to see whether it functions as intended,
- ii. estimate the relative position (difficulty) of each valid item along a scale that is the same for all persons,
- iii. assess each person’s responses to check that they form a valid response pattern,
- iv. estimate each person’s relative score (attitude or achievement) on the scale,
- v. make sure the person scores and the item scores fit together on a common scale that has been defined by the items and that share a constant interval or fixed unit from one end of the continuum to the other so that their numerical values can be marked off linearly,
- vi. ensure all numerical values are accompanied by standard errors which indicate the precision of the measurements on the scale, and

- vii. ensure the items remain similar in their function and meaning from person to person and group to group so that they are seen as stable and useful measures (B. D. Wright & Masters, 1981).

Each of these criteria can be successfully addressed by the Rasch Unidimensional Measurement Model. For this reason, use of the Rasch paradigm and its models is increasingly seen as an alternative and more effective measurement approach by social scientists. An important aspect of the Rasch paradigm is that in order to fulfil the principles of sound measurement, data are required to fit the Rasch Model. Anomalies (differences between the model and the data) can then be investigated in order to understand why they have occurred. This is the reverse of what occurs in Classical Test Theory, where models are chosen and/or modified in order to fit the data.

The Rasch Unidimensional Measurement Model, originally developed to calibrate tests of ability and intelligence (Rasch, 1960/1980), allows objective measurement of latent traits and provides information about how well an item or assessment is working to measure its intended outcome (Surges Tatum, 1998). Contemporary use of the model has seen it successfully applied to the construction and assessment of attitude scales (Allerup et al., 1991; Andrich & Styles, 1998; Waugh, 2002).

The remainder of this chapter will summarise the main features of the Rasch Unidimensional Measurement Model to help illustrate its application with attitudinal data, such as attitude or intention statements that may help to inform adolescent sexual behaviour. Once a basic outline of the main principles has been established, comparisons between Classical Test Theory and Rasch analysis will then be made.

### 2.4.3 Rasch unidimensional measurement model

When data arising from application of an instrument conform to the Rasch Model, Wright and Masters' (1981) requirements for objective measurement are satisfied. Rather than looking for associations between scores, and for factors posited to underlie such associations, as is the case with Classical Test Theory, the Rasch Model outlines specific criteria for measurement. Testing is then conducted to ascertain how well the data conform to these criteria. The mathematical formulae involved in this process are documented in several texts including *Best Test Design: Rasch Measurement* (B. D. Wright & Stone, 1979) and *Rasch Models for Measurement* (Andrich, 1988).

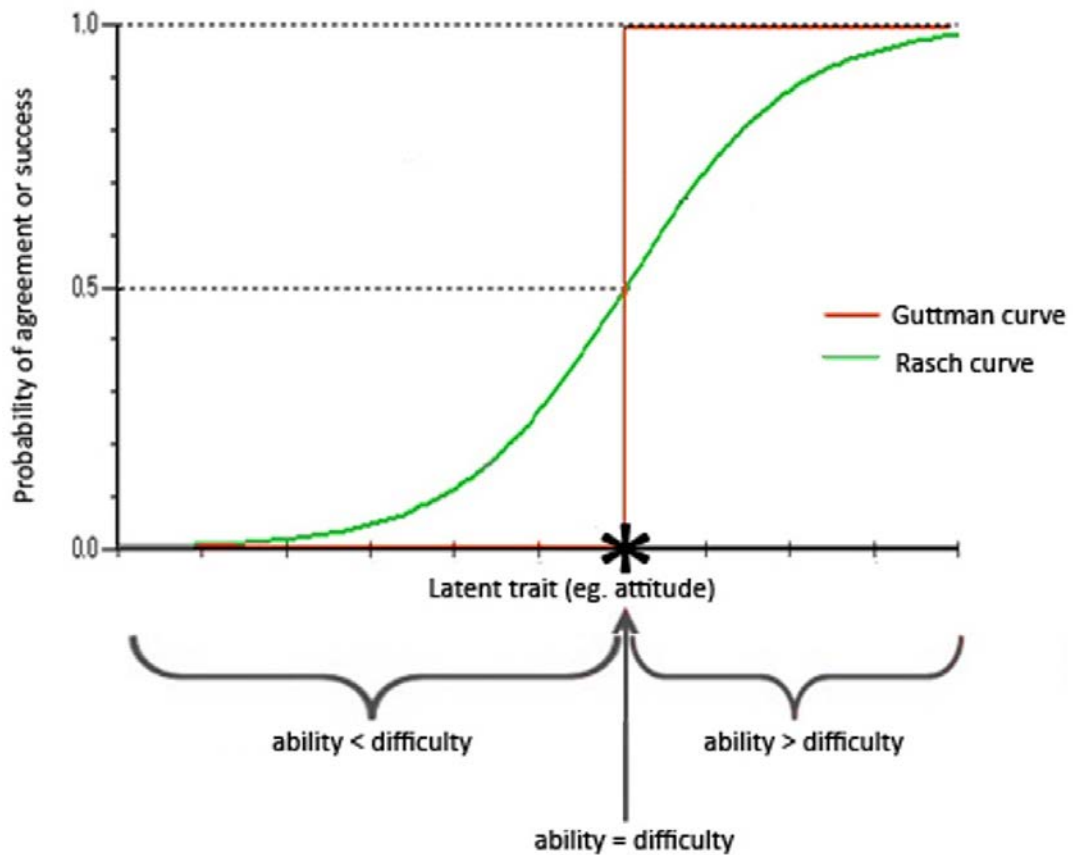
Based on its original conceptualisation with dichotomous data (i.e. data measured at one of two nominal levels, e.g. yes or no), the Rasch Model expresses the probability of any given score based on an exponential function of two parameters: the ability of the person and the difficulty of the item. The model has been further developed for application with polytomous or ordered response data (Andrich, 1978), such as attitudes, where successively higher scores indicate increasing levels of agreement, competence or attainment. Application of the Rasch Model to these more complex data sets introduces a third parameter regarding the probability of a response being made in any one response category (e.g. the probability of selecting *strongly agree*, *agree*, *disagree* or *strongly disagree*). In the case of attitudinal measurement, the model therefore helps to identify items which best discriminate persons with higher or lower levels of the latent trait being measured. In the context of this study, for example, it can help identify the most useful items for distinguishing between individuals who possess positive or negative attitudes towards contraception.

It is important to note that typical Rasch nomenclature will refer to the *ability of the person* (person scores) and the *difficulty of the item* (item scores). These labels make little sense when applied to attitude measures. It is therefore apt to note that in these instances, a high person ability (person score) refers to a high degree of agreeability with a statement and high item difficulty (item score) refers to an item that requires a high degree of agreeability (i.e. it is difficult) to endorse; this is often referred to as an item's intensity. Hence, the strength of an individual's conviction and how difficult the statement is to agree with are used to ascertain the probability of agreeing with a statement.

When the data fit the model, the more intense or difficult items are likely to be affirmed only by the persons who possess the higher attitude levels (e.g. those with the more positive attitude towards contraception), whereas the easier items are affirmed by persons with lower attitudinal levels as well as those with higher levels (Cavanagh & Romanoski, 2006). This ability of the Rasch Model to compare persons and items directly, and on the same scale, means it is possible to create "*person-free measures and item-free calibrations, as we have come to expect in the physical sciences; abstract measures that transcend specific persons' responses to specific items at a specific time*" (T. G. Bond & Fox, 2001 p. 203).

In more specific terms, the Rasch Model is a probabilistic version of a Guttman scale (Andrich, 1985). A Guttman scale, as first described by Louis Guttman (1944), utilises a set of questions to ascertain the degree to which respondents agree with a concept or

principle. To highlight the difference between these approaches, Figure 2.5 illustrates the response structure of a single dichotomous item under both Guttman (red line) and Rasch (green line) principles.



**Figure 2.5.** The response structure of a single dichotomous (yes/no) item under Guttman and Rasch principles.

In a hypothetical and deterministic Guttman scale, a unidimensional set of items are ranked by order of difficulty and agreement with any one item implies agreement or success with all lower-order items. At the point where person ability or latent trait possession matches item difficulty (\*), the individual will get this item and all lower-order items correct, but will not succeed on any higher-order items. Using the example provided in Figure 2.5, any person located to the left of the mark (\*) would be expected to fail the item (or disagree with it) and any to the right would be expected to agree or respond affirmatively. In contrast, for the same person responding to this item, in the probabilistic Rasch Model, a person has a 50% probability of getting the item right if their ability or latent trait possession matches item difficulty(\*).

Therefore, in the Rasch Model, if an individual's level of agreeability with a statement (person ability; e.g. how much they value using contraception) exceeds the effort needed to

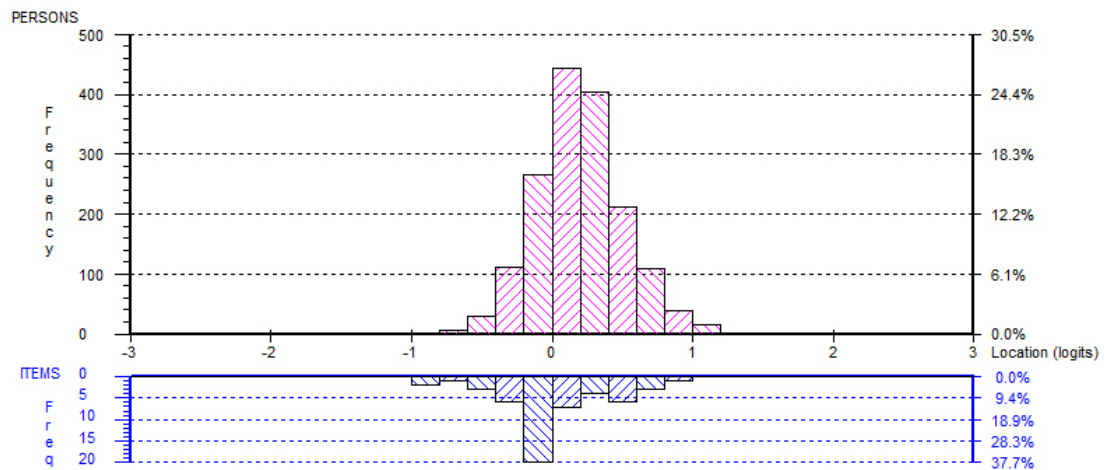
endorse the item (item intensity; i.e. how easy the idea is to endorse) their probability of success or responding affirmatively will surpass 0.5. Furthermore, the probability of responding affirmatively increases the further to the right of the item the person is. Likewise, if item difficulty exceeds person ability or latent trait possession the probability of success or responding affirmatively falls below 0.5. The curve representing these probabilities, as attitude strength increases, is shown graphically in Figure 2.5 (green line) and is termed an Item Characteristic Curve (ICC).

When the Rasch Model is applied to a polytomous (ordered response) data set, as is often the case when measuring attitudes, a Category Characteristic Curve (CCC) can be produced for each item in addition to the ICC. A CCC illustrates the behaviour of each response category and can indicate the probability of a person located at a particular point along the item/person continuum (X-axis) choosing a particular response category (e.g. *strongly agree, agree, disagree* or *strongly disagree*) based again on an exponential function of the ability of the person and the difficulty of the item. The cut-points between each pair of adjacent categories are known as thresholds. Further information on this specific type of output is detailed later.

A variety of software programs are available to assess how well data conform to Rasch criteria (R. J. Adams, Wu, & Wilson, 1998; Andrich, Sheridan, & Luo, 2008; Linacre & Wright, 2000). They function by subjecting collected person and item scores to a logarithmic transformation, thereby converting ordinal data to interval data. These transformed person and item measures (locations) can be plotted on a continuum using a common unit of measurement termed a *logit*. In the case of attitude measurement, these logits are the logarithmic odds of a person affirming that the attitude statement in question applies to him/her, and the continuum would indicate increasing agreement with the attitude statement.

Figure 2.6 provides an example of a person-item location distribution map available from the software program Rasch Unidimensional Measurement Model 2030 (RUMM2030) (Andrich et al., 2008). These maps plot both person (red) and item (blue) locations on the same logit scale. A logit value of 0 is arbitrarily set as the average, or mean, of all item and person estimates (T. G. Bond & Fox, 2001). In Figure 2.6, the person locations are well-match to the item locations, indicating that for this group of people the items will distinguish respondents well. For items, either mean item locations or their threshold locations can be plotted. Further explanation of threshold values will be provided later.





**Figure 2.6.** Example of a person-item distribution map.

At any point along the continuum, where the agreeability of the person in question and the difficulty of an item are equal, the probability of that person endorsing the item would be 0.5 (refer Figure 2.5). An *item's location* is the relative difficulty that respondents have in responding affirmatively to items. Items to the right of any point on the continuum are more difficult to endorse than those to the left, with their actual content helping to define what more or less of the construct signifies. A *person's location*, in logits, is their natural log odds of agreement on all items and so people with higher agreeability will be located further to the right of the scale.

Locations (in logits) possess several advantages over raw scores. Firstly, now that these measures share a common unit on common scale, researchers can readily visualise the rank order difficulty of each item to ascertain where any individual person is located in relation to all items (B. D. Wright & Masters, 1981). Secondly, the process of converting ordinal data to interval data means that an equal difference in logits implies equal difference in ability or attitude (B. D. Wright & Masters, 1981). Item and person logit scores can therefore be summed and used in standard statistical analyses. Finally, unlike raw person and item scores, these measures allow comparison between two subjects from the same group to be made independently of the items chosen for comparison, and for comparisons between two items to be made independently of the participants (Andrich & Styles, 2004).

To assess conformity of the data to the principles of Rasch measurement, the various software packages produce both expected (according to the Rasch Model) and observed values. To encapsulate the observed measures, person location values are ranked and then divided into class intervals of approximately equal numbers. The average response of

persons within each class interval is then calculated. If the data fit the model, then the mean scores of people in each class interval should be close to their theoretical values.

By comparing expected and observed values, the software packages provide an extensive range of information that can be utilised to assess how well the data conform to the Rasch Model; and for polytomous data, ordering of response categories such as *strongly agree*, *agree*, *disagree* and *strongly disagree* can be checked to see if they make sense empirically. No single test of fit statistic is paramount, and each must be utilised for comprehensive appraisal of the data (R. M. Smith & Plackner, 2009). Knowledge of the construct, scale, sample and test conditions can help to explain or hypothesise any discrepancies between the model and the data. *“Failure of the data to conform to the Rasch Model implies further work on the substantive problem of scale construction, not on the identification of a more complex model that might account for the data”* (Andrich, 1988 p. 86). Refinement of ill-fitting items will help create an instrument that better measures the latent trait under consideration.

The various output and fit statistics that can be generated from a Rasch analysis process will now be explained in greater detail, using the work of Cavanagh and Romanoski (2006) in many instances to provide an authentic example of application of the Rasch Model. In this study researchers aimed to create a linear scale that would measure school students' perceptions of their classroom learning culture. The output discussed was developed through use of the interactive computer program RUMM2030 (Andrich et al., 2008) and previous versions of this software program, which enables a wide range of facilities for appraising data. Although the exemplar study is based in the field of education, the researchers provide an extensive overview of many of the important checks and procedures pertaining to RUMM2030, which have only been previously addressed in isolation.

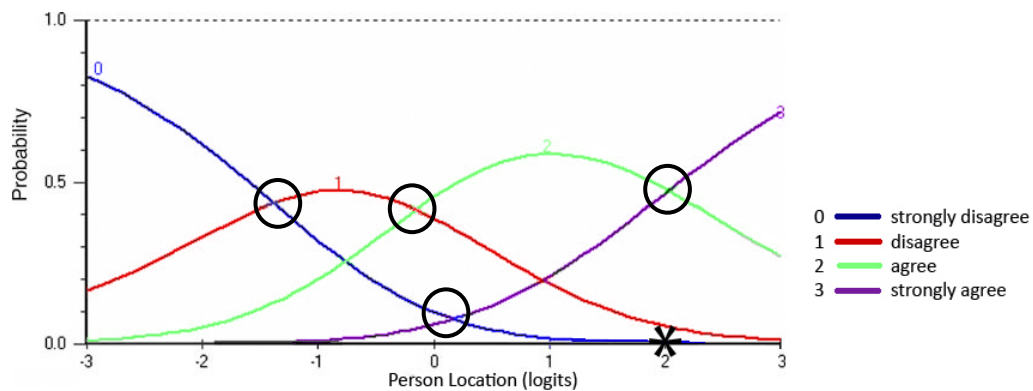
#### 2.4.3.1 Thresholds

A threshold is specified as the point where the probability of person scoring in either of two adjacent categories is equally likely. For polytomous data sets such as a Likert scale used to measure attitudes, prior to any examination of fit, checks are needed to confirm that the ordered response categories reflect a logical pattern (e.g. negative to positive) that is in accordance with the scoring function specifications (RUMM Laboratory, 2005). The Rasch Model is able to examine each item separately to check whether item thresholds are

ordered sequentially. For any item analysis involving polytomous data the concept of ordered categories is paramount.

If scoring function specifications are followed, this means that for each separate scale item, the highest response (e.g. *strongly agree*) has the greatest probability of being selected by individuals who score highly on the scale overall. For Cavanagh and Romanoski's (2006) work this meant that students with a highly affirmative view of their classroom culture should have consistently selected the *strongly agree* category on the four-point Likert scale.

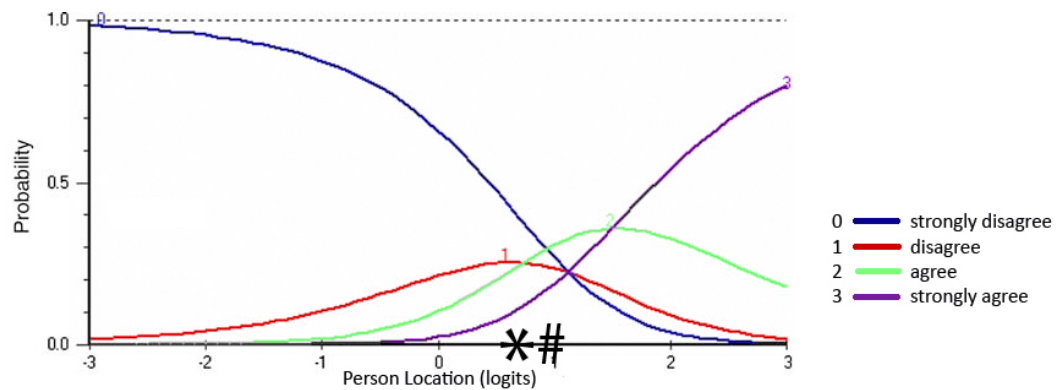
To check the ordering of thresholds, the RUMM2030 program creates a CCC for each item. Figure 2.7 illustrates the CCC for item used in Cavanagh and Romanoski's (2006) study where the item is discriminating correctly. In this instance the thresholds are considered to be ordered. The CCC in this example shows the probabilities of persons choosing a given response category (Y-axis) given a range of personal measures of affirmative outlook regarding classroom culture (X-axis). The thresholds are indicated by black circles. As the student's overall level of agreeability increases, the probability of endorsing this item also increases. Using this graphical example, an individual with a person ability location of 2.0 logits (\*) has an equal chance of responding or selecting either category 2 or 3, *agree* or *strongly agree*.



**Figure 2.7.** Category characteristic curve with ordered thresholds (adapted from Cavanagh & Romanoski, 2006, p. 280).

Figure 2.8 is an example from the same study where an item possessed disordered thresholds. In this case the boundary, or threshold, between the curves for scores 1 and 2 (\*) is located lower down the continuum than the threshold between the curves for scores 0 and 1 (#). In this instance, where the scoring system reflects the following: 0=*strongly disagree*, 1=*disagree*, 2=*agree*, 4=*strongly agree*, this implies that the boundary between *disagree* and *agree* was lower than the boundary between *strongly disagree* and *disagree*.

Empirically this makes no sense, as it would mean a person with a negative outlook of classroom learning culture has a greater probability of choosing a more positive response category than a person with higher ability/great affirmation of classroom learning culture. Furthermore, this example indicates that there is no region in the continuum where a score of 1 or *disagree* (red curve) is the most likely. Instead, individuals with a logit score of 1.0, are more likely to score a 0 (*strongly disagree*) or 2 (*agree*) for this item.



**Figure 2.8.** Category characteristic curve with disordered thresholds (adapted from Cavanagh & Romanoski, 2006, p. 281).

Thresholds that are not properly ordered are indicative of broader validity and reliability issues (Andrich & Styles, 2004). When faced with disordered thresholds it is possible for researchers to remove these ill-fitting items or to collapse categories post hoc and investigate the type of response category that may work, although ideally additional data would be collected with these new categories (Andrich & Styles, 2004).

The RUMM2030 program can also generate an Item Threshold Map showing the frequency of scores and threshold points of all items simultaneously to help identify areas of data misfit. An example is provided in Figure 2.9. In this example the individual items are ranked in location order ranging from the easiest to agree with through to the hardest, with each category score coded in a different colour. Threshold points can be located on this map by reading the logit location where two colours intersect. The frequency of persons selecting a particular response category will of course vary with, and indicate the level of difficulty of, an item. For example, the number of people selecting category 2 for Item C, the easiest item to agree with, is much greater than for any other item. Very few people select category 1 for Item F. The example also illustrates that the distances between response categories does not appear to be consistent across all items, with threshold points at

markedly different distances apart. A more ideal scenario would see threshold points for all items with similar distances between them, as is illustrated by Figure 2.10.

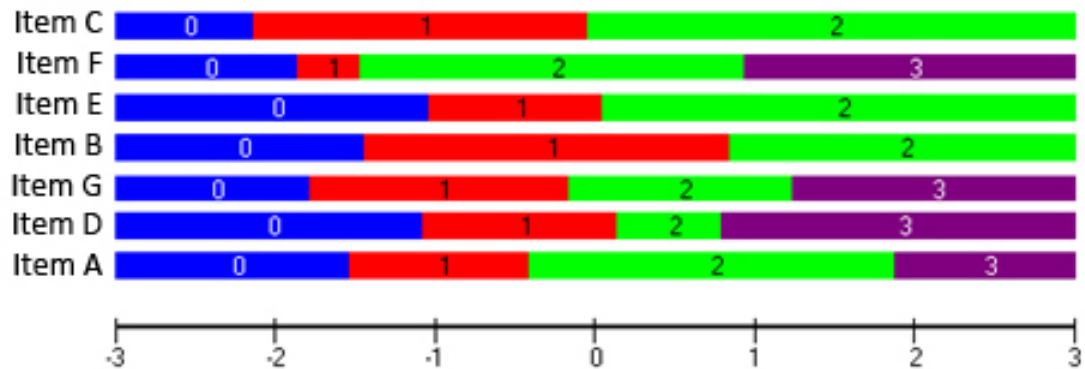


Figure 2.9. Example of an item threshold map.

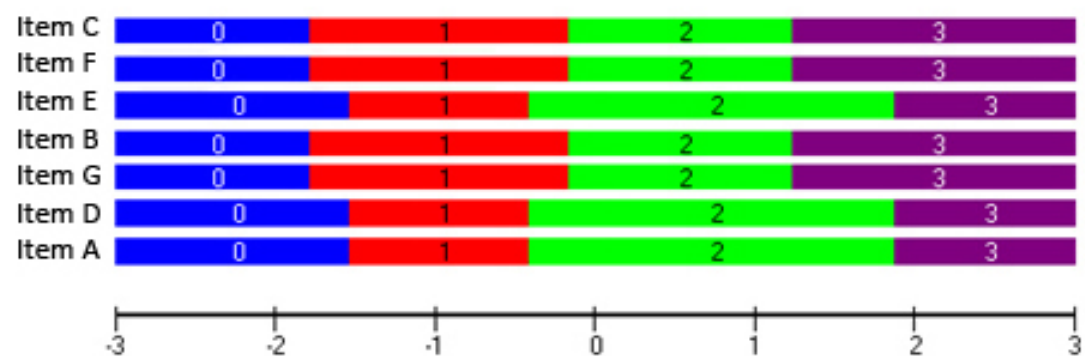


Figure 2.10. Example of an item threshold map with well aligned threshold values.

### 2.4.3.2 Fit statistics

Once item thresholds are deemed to be correctly ordered, such as in the example provided in Figure 2.7, a variety of statistics relating to fit can be generated. The RUMM 2030 software provides both fit statistics that are broad in nature to indicate how well all items or all persons as a whole conform to the Rasch Model, and also the fit statistics of each item and person specifically to help detect, explain and possibly remove outliers.

#### Item Fit Statistics

An item location, measured in logits, is assigned to each item to indicate the log odds of success for that item or the log odds of responding affirmatively. In the case of Cavanagh and Romanoski's (2006) study the item locations were the relative difficulties that students demonstrated in responding affirmatively to the items. A negative logit location score

indicates that the item is relatively easy to achieve or affirm, and as item locations become more positive they increase in difficulty (Table 2.1). The assignment of interval measures to each item means that not only can items be ranked by difficulty; but that the relative difference between items can be expressed (e.g. item A is twice as hard to agree to as item B). Using the example provided in Table 2.1, item 16 (location=0.61 logits) is twice as hard to affirm as item 13 (location=0.30 logits). Similarly, items five and nine have the same logit locations (-0.30 logits), indicating that they possess the same degree of difficulty to affirm.

Fit statistics pertaining to each item include residual and chi square ( $\chi^2$ ) tests. The information generated can be used to argue for the retention or removal of items.

#### *Item-Fit residual*

Residuals are established by comparing observed scores and expected values. The greater the difference between these two variables, the higher the absolute value of the residual. A negative fit residual indicates that the item is over-discriminating in relation to the summary discrimination of all items and a positive value suggests the item is less discriminating. For an item to fit the model based on this one criterion, the fit residual should lie between -2.5 and 2.5 (RUMM Laboratory, 2004).

#### *Item-trait (chi square) test of fit*

A chi square test can be performed on each item to check its behaviour across the entire range of person locations. The intention is to show that items are discriminating as expected across persons. If the  $\chi^2$  p value is less than 0.05 this implies that the discrepancy between the observed mean and expected values is large relative to chance and that the item should be examined further and possibly removed. For an item to work consistently with other items in the scale, individuals with a high overall scale score should also tend to have a high probability of success or agreement with that item. To show this,  $\chi^2$  values should increase gradually with none found to be statistically significant (Andrich & van Schoubroeck, 1989).

Most of the fit statistics provided in Table 2.1 comply with the aforementioned criteria for good data-to-model fit: low residuals ( $\leq \pm 2.5$ ) and high  $\chi^2$  probability ( $p > 0.05$ ). In this table, the location is the item difficulty measured in logits and SE indicates the standard error in estimating item difficulty.

**Table 2.1**  
**Item Locations, Standard Errors, Residuals and Item Fit to the Model for the 29-item Classroom Learning Culture Scale (adapted from Cavanagh & Romanoski, 2006, p. 283)**

Item	Location	SE	Residual	df	N	$\chi^2$	p
<b>Individual student attributes (6 items)</b>							
1	-0.66	0.07	0.01	584.1	608	9.2	0.42
2	-0.59	0.07	-0.40	584.1	608	2.7	0.98
3	-0.55	0.07	1.09	584.1	608	17.3	0.04
4	-0.51	0.07	0.34	584.1	608	13.2	0.15
5	-0.30	0.06	-0.03	584.1	608	6.5	0.69
6	-0.39	0.06	-0.68	584.1	608	14.4	0.11
<b>Individual student schoolwork (4 items)</b>							
7	-0.43	0.07	2.68	584.1	608	26.4	0.00
8	-0.38	0.07	-0.64	584.1	608	10.2	0.34
9	-0.30	0.07	2.67	584.1	608	15.8	0.07
10	0.19	0.06	1.89	584.1	608	18.2	0.03
<b>Class-group schoolwork (7 items)</b>							
11	-0.32	0.07	-1.98	584.1	608	14.7	0.10
12	-0.26	0.07	1.19	584.1	608	14.6	0.10
13	0.30	0.06	-0.21	584.1	608	6.0	0.74
14	0.37	0.06	-0.99	584.1	608	7.6	0.58
15	0.53	0.06	-1.26	584.1	608	8.7	0.47
16	0.61	0.06	-1.13	584.1	608	11.4	0.25
17	-0.65	0.07	-0.51	584.1	608	12.3	0.20
<b>Class-group peer relationships (4 items)</b>							
18	-0.34	0.06	-1.99	584.1	608	12.2	0.20
19	0.38	0.06	-0.69	584.1	608	12.4	0.19
20	0.65	0.06	-0.01	584.1	608	5.3	0.81
21	0.91	0.06	1.28	584.1	608	15.6	0.08
<b>Teacher encouragement of students (4 items)</b>							
22	-0.62	0.07	-1.22	584.1	608	9.4	0.40
23	-0.16	0.06	1.11	584.1	608	19.4	0.02
24	0.06	0.06	-0.82	584.1	608	12.4	0.19
25	0.35	0.06	1.61	584.1	608	22.3	0.01
<b>Teacher receptivity to students (4 items)</b>							
26	-0.42	0.07	-1.09	584.1	608	11.8	0.22
27	0.51	0.05	1.29	584.1	608	8.8	0.46
28	0.58	0.06	0.93	584.1	608	8.8	0.46
29	0.64	0.06	2.48	584.1	608	18.7	0.03

### Person Fit Statistics

A person location, measured in logits, is representative of a person's performance on *all items*, and can be used to represent a total score in statistical analyses. Similar to the item fit statistics a residual fit statistic can be calculated. If data fit the Rasch Model, the total raw scores will directly correlate with the person locations across most of the range of locations. Only at the two extremes (high and low locations) will this not occur, as the ogive curve created by this logistic model means there is substantial stretching at the outer limits (Andrich & Styles, 2004). The residual fit statistic illustrates the degree of conformity

between observed and expected values with a range of -2.5 to 2.5 considered an acceptable fit (RUMM Laboratory, 2004).

### Summary Test of Fit Statistics

Once the fit of items and persons have been examined individually, ill-fitting items and extraneous respondents may be removed. It is then possible to view the overall fit of the resultant set of items to the Rasch Model. Table 2.2 provides an example of the output the RUMM2030 program can produce, again using the work of Cavanagh and Romanoski (2006).

**Table 2.2**  
***Summary of Test of Fit Statistics for the 29-item Classroom Learning Culture Scale (adapted from Cavanagh & Romanoski, 2006, p. 285)***

<b>Item-person interaction</b>		
	<i>Item Fit Residual</i>	<i>Person Fit Residual</i>
<i>Mean</i>	0.21	-0.35
<i>SD</i>	1.36	1.70
<b>Item-trait interaction</b>		
<i>Total item <math>\chi^2</math></i>	366.10	
<i>Total df</i>	261	
<i>Total <math>\chi^2</math> probability</i>	0.000019	
Proportion of observed variance considered true for the scale is 0.92 (92%)		
Cronbach's alpha is 0.92		
<b>Power of test-of-fit</b>		
Power is excellent		
(based upon Separation Index of 0.92)		
<i>N=622</i>		

### *Item-person interaction*

The item-person interaction illustrates the degree to which items and persons fit the Rasch Model through use of two residual statistics. The *Item-Fit Residual statistic* provides information on the overall fit of the items to the Rasch Model. In this test, the residual between the expected estimate and the actual value for each item is summed over all persons. The value is transformed to make it a normal curve based on the assumption that for items to fit the Rasch Model, deviations between the responses and the model are no more than random errors. For items to fit the model, the mean across all items should be close to 0 and the standard deviation close to 1 (RUMM Laboratory, 2004). In the example from Table 2.2, the residual is 0.21 and the standard deviation is 1.36, indicating that it passes this test of fit.

The *Person-Fit Residual* provides information on the degree to which the overall pattern of person responses conforms to the Guttman pattern. The residual between the expected estimate and the actual value for each person is summed over all items, with the data fitting the model if the fit statistics again approximates a normal distribution (RUMM



Laboratory, 2004). In Table 2.2, the residual is -0.35 and the standard deviation is 1.70. The authors of this paper indicate that this is an acceptable fit to the measurement model (Cavanagh & Romanoski, 2006).

#### *Overall item-trait interaction test of fit*

The Item-Trait Interaction Test of Fit (a chi square;  $\chi^2$ ) assesses the overall fit of the set of items to the Rasch Model. It checks the behaviour of all items across the entire range of person scores to provide evidence about the internal consistency of the set of items.

The RUMM2030 program examines the differences between the expected values predicted from the model and the observed values, with a good fit to the model present when the total item chi square statistic is similar to the total degrees of freedom (DF) and the probability value (p value) is greater than 0.05 (Licari, 2008). The example illustrated in Table 2.2 indicates that the overall  $\chi^2$  was high ( $p < 0.000$ ). The researchers' explanation for this was that the scale was probably not measuring a unidimensional trait but was more likely to be measuring a dominant trait (Cavanagh & Romanoski, 2006). Since the overall chi square value is a sum of all the chi square values, a high statistic on even one item will inflate the total. Therefore is often more desirable to assess chi squares individually.

As  $\chi^2$  values are sensitive to sample size, the RUMM2030 program allows the sample size to be modified exclusively for chi square calculations. Simulation studies with items that fit the model show that chi square statistics remain largely unchanged when sample sizes are adjusted (Andrich & Styles, 2009). Consequently, chi square statistics increase dramatically for items that misfit the model (RUMM Laboratory, 2004).

#### Local independence

A key requirement of the Rasch model is that items should only be correlated with each other via the construct of interest (Lord & Novick, 1968). Examining a correlation matrix of item residuals, where correlations are  $\leq 0.30$ , indicate that item responses are a result of the trait level and not due to their responses to other items (Kersten, White, & Tennant, 2010).

#### Differential Item Function

A unique feature of Rasch analysis is its ability to investigate whether constructs of interest are invariant in meaning across different sub-groups of the sample (e.g. sub-groups of gender, age and ethnicity). For each person location, the RUMM2030 program will indicate whether the expected value on an item is the same irrespective of what group the person may belong to, in a process termed differential item functioning (DIF) (Andrich & Hagquist,

2001). DIF is said to occur when sub-groups of participants with the same level of agreeability perform differently on particular items. In this situation, the probabilities of a response to an item cannot be explained wholly by the agreeability of the respondent and the difficulty of endorsing the item, as their performance is differentially influenced by another characteristic under consideration (e.g. their gender or age).

When DIF is uniform, the item of interest consistently gives one group an advantage, or a higher score, regardless of their level of agreeability. Uniform DIF should be investigated in conjunction with the fit statistics, as it may account for extreme item or person scores. To remove the effects of uniform DIF, items can be split (e.g. into male and female responses) and analysed as separate items. An item with uniform DIF, that cannot be easily split, may need to be removed.

DIF can also be non-uniform, meaning the bias is not consistent. For example, at the low end of the scale males may score higher than females and this relationship may reverse at the high end of the scale. Items which display non-uniform DIF need to be removed from the scale as there is no known mathematical technique to correct this bias (Kersten & Kayes, 2011).

If there is no evidence of DIF according to the different factors of interest, the transformed person scores (i.e. the person locations) can be utilised in standard statistical analyses (Andrich & Styles, 2004) for investigation of other research questions such as comparison of group mean scores.

### Reliability Indices

RUMM2030 provides two reliability indices based on patterns of responses to the test items and item parameters: the *Cronbach's alpha* and the *Person Separation Index* (PSI). The Cronbach's alpha indicates the proportion of observed variance that is considered to be error free variance and should be close to 1.0 (Cavanagh & Romanoski, 2006). It cannot be calculated when there are missing data. The Cronbach's alpha score in the Classroom Learning Culture Scale, as illustrated in Table 2.2, was 0.92 (Cavanagh & Romanoski, 2006), indicating high reliability of the items.

The PSI provides information for each item concerning the relative separation of the persons tested; thereby indicating the level of accuracy the scale has in estimating an individual's trait level (Andrich & van Schoubroeck, 1989). The empirical reliability of the test is generated based on the standard errors of individual respondent scores (Andrich & van Schoubroeck, 1989). In contrast to a Cronbach's alpha score, the PSI can be generated

when respondents have not answered all items. Ideally, the PSI will be close to 1.0. The Classroom Learning Culture Scale reported a PSI of 0.92 (Table 2.2) meaning that 92% of the observed variance in the scale can be considered true variance which is error free.

In the example provided by Cavanagh and Romanoski (2006), the two reliability indices are the same. This will occur when person and items are well aligned and when there is complete data (RUMM Laboratory, 2012).

### Unidimensionality

Unidimensionality refers to the existence of one underlying measurement construct that accounts for variability in participant responses. Traditionally, if a given set of items fit the Rasch model, this is taken as evidence of unidimensionality (B. D. Wright & Panchapakesan, 1969). Whilst alternate approaches for the assessment of dimensionality, have been detailed elsewhere (Hattie, 1985; Tate, 2003; Tennant & Pallant, 2006; Yu, Popp, DiGangi, & Jannasch-Pennell, 2007), this research will focus on the classic interpretation as it is the easiest to interpret.

### Construct Validity

Fit statistics can be used to help establish construct validity. Messick (1989) has identified two threats to construct validity: construct under-representation and construct-irrelevant variance. The Rasch measurement process is sensitive to both these issues (T. G. Bond, 2003). Construct under-representation, where a scale only partially represents the breadth of the construct, is evident when gaps are present along the unidimensional continuum (Baghaei, 2008). Construct-irrelevant variance, or the presence of items that are irrelevant to the focal construct, occurs when items that are misfitting the Rasch Model are detected (Baghaei, 2008).

### Item Map

Finally the RUMM2030 program is also able to produce an item map displaying the location of item thresholds and the location of respondents on the same scale. An example is provided in Figure 2.11. In this example the scale is provided in logits or the logarithmic odds of answering positively. Each 'X' represents a class interval of three students and the item labels show the numerical label assigned to each item with decimal value indicating the threshold. For example, 21.3 (circled) is the third threshold for item 21 or the threshold point between *agree* and *strongly agree*. The student logits (left of scale) ranged from -2.4 (low) to +4.2 logits (high). The item threshold locations (right of the scale) ranged from -2.2 ('easy' items) to +2.8 logits ('difficult' items). Ideally, the distribution of student logits would

mirror the distribution of item logits. For these data, the range of item thresholds matched the range of student logits quite well. In addition, the thresholds for each of the 29 items were ordered according to the implicit ordinality of the response categories.

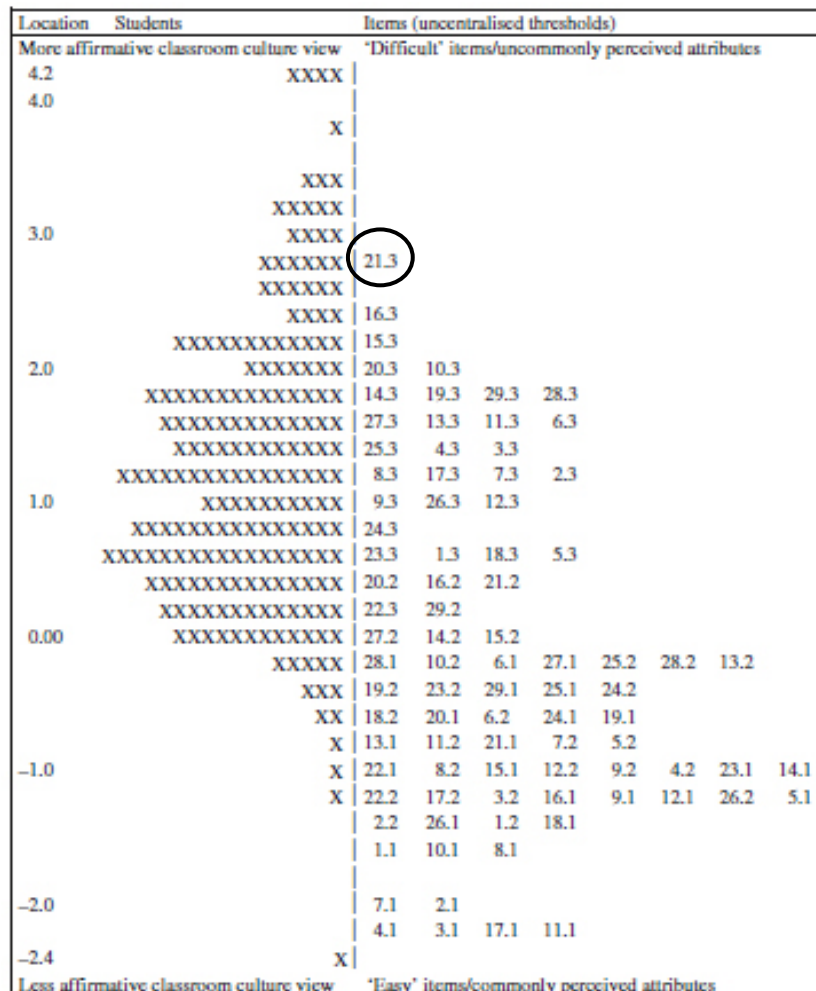


Figure 2.11. Item map of item thresholds and student locations for the 29-item Classroom Learning Culture Scale (adapted from Cavanagh & Romanoski, 2006, p. 286).

## 2.4.4 Stochastic versus deterministic measurement models

Whilst there is strong advocacy amongst psychometricians for the use of traditional deterministic techniques (i.e. techniques that are governed by predictable laws)(Waugh & Chapman, 2005), it has been argued that linear statistical analyses such as Factor analysis, Structural Equation Modelling and Hierarchical Linear Modelling can work better when the data analysed are interval-based values (Cavanagh & Romanoski, 2006). The Rasch Model, in contrast, is a probabilistic or stochastic model that calibrates scale items to ensure their adherence to the principles of objective measurement. It translates raw scores to measures

that can be used in subsequent arithmetic operations and linear statistics. The purpose of the analysis is not to model the data, but to check whether they conform to the principles of fundamental measurement (Andrich, 1988). When fundamental measurement has occurred the association between two variables are invariably multiplicative or equivalently additive; and invariant comparisons can be made in terms of a constant unit (Andrich, 1988).

Although Classical Test Theory approaches to item analyses are still widely used today, Rasch results are considered simpler to interpret, more stable, more informative and more theoretically defensible (Chang, 1996). Deterministic approaches assume that response choices to an item are equally distributed. For example they would assume the difference between *strongly agree* and *agree* on a questionnaire to be the same as the difference between *strongly disagree* and *disagree*, or that the difference in two scores such as 60 and 65 is equal (quantitatively and qualitatively) to the difference between scores of 90 and 95. In contrast, the Rasch Model is able to check if responses truly exist on an equal interval continuum and can identify core constructs when collinearity dominates (B. D. Wright, 1996).

By ranking items relative to one another in order of difficulty, previous Rasch studies have shown that measures of attitude and behaviour lie on the same continuum, with attitude items mostly preceding behaviour items (Allerup et al., 1991; Andrich & Styles, 1998; Waugh, 2002). Items are positioned along an equal interval continuum, so that responses can be summed and a score or estimate for each person can be derived which objectively measures the strength of the individual's attitude or behaviour.

Important statistics about test items (e.g. their difficulty) generated from classical techniques can only be confidently generalised to the population from which the sample was drawn (Kline, 2005). These techniques also require all items to be administered in order to derive and interpret scores. In comparison, calibration of items using the Rasch method is independent of the sample used and will enable an individual to obtain the same score irrespective of the number and specific items to which they respond (B. D. Wright & Stone, 1979). This also means that missing data are routinely accommodated. When successfully operationalised, these items or questions will provide an individual score solely indicative of the difference between the ability of the person, or the strength of their attitude, and the difficulty of the item (B. D. Wright & Stone, 1979).

## 2.5 Summary of literature review

It is from the information presented and issues raised in this literature review that the present study is constructed. The reality that Australian adolescents, in comparison to older age groups, are disproportionately affected by a range of adverse sexual health outcomes (Bearinger et al., 2007; Glasier et al., 2006; O'Rourke, 2008) warrants their selection as a focus for this research.

Adolescents' attitudes (and similar concepts such as their beliefs, values and intentions) have been shown, through systematic reviews within the United States, to be the most significant predictors of sexual behaviour and the most amenable to change by pregnancy and STI prevention programs (Kirby, 2007; Kirby & Lepore, 2007). Whilst school-based sexual health curricula in Australia is based on world's best practice, it is inconsistently and inadequately delivered in schools (O'Rourke, 2008; Skinner & Hickey, 2003; A. M. A. Smith et al., 2011; H. Williams & Davidson, 2004); with limited attention given to the contribution attitudes have on shaping behaviour. It is possible that the newly proposed national curriculum for health and physical activity (Australian Curriculum, 2014) will further marginalise the importance of sexual health attitudes.

In an effort to encourage Australian educators to more fully embrace the important role of attitudes in shaping sexual behaviour, a variety of tasks could be undertaken. Initially, the current attitudes of Australian youth towards various sexual health issues should be measured and documented. Furthermore, research should establish if the attitudes of Australian adolescents who engage in RSB are different to those of their peers, and to determine the impact of attitude on behaviour in comparison to the range of other individual, familial or extrafamilial factors known to influence behaviour.

An objective measurement tool would help researchers to effectively document attitude change in students and assist with intervention evaluation. If linkages between sexual attitudes and behaviours can be established, these attitude scales could potentially be used to identify adolescents most likely to engage in RSB. A targeted intervention could then be applied to those students at highest risk. Such an intervention would be well-informed of the specific values, attitudes, beliefs and intentions of the adolescent and would be equipped with assessment tools that could appropriately measure these constructs over time.

To compound this issue, ineffective measurement techniques have hampered efforts to successfully link attitude with behaviour (Ajzen & Fishbein, 2005; Eagly & Chaiken, 1993). In an effort to address this problem, the Rasch Unidimensional Measurement Model (Rasch, 1960/1980) should be used to provide evidence of the internal consistency and reliability of sets of items, and to convert person scores to objective interval measures prior to use in subsequent statistical analyses.

## CHAPTER 3

### *Research Methodology and Method*



### 3.0 Overview

The previous chapter summarised current research relating to adolescent sexual health and attitudes, highlighting several areas where knowledge was limited. Research aims and objectives were developed to address these shortfalls, and are detailed in this chapter. Chapter Three also describes the research methodology and methods applied in this study; with discussion of sampling, instrumentation and data analysis.

### 3.1 Research aim and objectives

The aim of this research project was:

*to determine if the attitudes and intentions held by adolescents in Perth, Western Australia, are associated with sexual behaviours that place them at risk of an unwanted pregnancy or sexually transmitted infection.*

The following objectives were met in the course of this investigation:

- i. Construct unidimensional interval scales to measure the attitudes and intentions of adolescents in relation to abortion, adolescent parenthood and contraceptive use.
- ii. Determine both the construct validity and the reliability of the attitude and intention scales using the Rasch Unidimensional Measurement Model, and modify the scale(s) based on these analyses.

Utilising the scales developed in the first two objectives:

- iii. Describe the attitudes and intentions of adolescents living in Perth, Western Australia in relation to their sexual histories.
- iv. Determine the effect of individual, familial and extrafamilial factors on attitudes and intentions.
- v. Determine whether adolescents who have engaged in risky sexual behaviour hold different attitudes and intentions from their peers who have not engaged in these behaviours.
- vi. Determine the association between the scale scores and risky sexual behaviour when considering other individual, familial and extrafamilial factors.

## 3.2 Research methodology

This doctoral research used a quantitative research design based on positivist principles. Positivism is an epistemological perspective which holds that scientific knowledge is attained through concisely defined phenomena, and affirmation of theories, derived through strict use of the scientific method (Struwing & Stead, 2001). In the most extreme form of this perspective, observation and measurement are considered the core of scientific endeavour, and researchers must remain objective and not allow their values to influence the formation of the experiment or the interpretation of the findings (Struwing & Stead, 2001). Since some phenomena such as attitudes, emotions and thoughts cannot be directly observed; true positivists would not consider these to be legitimate topics for scientific investigation. This, and other concerns, led to the development of modified forms such as neo-positivism and logical positivism (Struwing & Stead, 2001).

Whilst this research project is quantitative, it was informed by data from a previous research project that had employed a qualitative methodology. The “Teen Relationships Study” (Skinner, 2005) conducted in-depth semi-structured interviews with a purposive sample of adolescent females who possessed a range of experiences surrounding pregnancy. A grounded theory approach (Bryant & Charmaz, 2010), based on the epistemological perspective of interpretivism, was used to develop an initial set of scale items aimed at describing attitudes and intentions towards different sexual issues. Scale items were derived from recurring interview themes and the participants’ own language. These scale items were the starting point for this doctoral research.

Following the development of objective unidimensional scales (using the aforementioned attitude and intention scale items) descriptive and correlational analyses were performed. Descriptive research relies on observation as a means of collecting data to help establish normative values (Walliman, 2005). Depending on the type of information sought, this observation can take many forms, such as interviews, questionnaires and photographs. This project sought to undertake a descriptive analysis of adolescent attitudes, including a description of different sub-populations. Correlation studies, or more specifically relational studies, investigate possible associations between phenomena and the strength of those associations (Walliman, 2005). For this project, the research aimed to establish what, if any association existed between attitude or intention and RSB. The relative contribution of other individual, familial or extrafamilial factors was also investigated. Whilst association between variables can be established, cause and effect relationships cannot be determined using this method (Walliman, 2005).

A cross-sectional research design and quantitative approach was utilised, involving the use of self-completed questionnaires. Cross-sectional studies assess the prevalence of a property by observing a population or a representative sub-sample at a defined time point (Gordis, 2004). Social researchers working within the positivist scientific tradition strongly advocate the use of questionnaires or surveys because, if used correctly, they (a) are administered under controlled conditions, (b) are presented logically, and (c) help ensure the personal influence of the researcher on any results is minimal (McNeill & Chapman, 2005). Questionnaires are considered highly reliable by positivist advocates as they are easily replicated and the quantifiable data can be verified by others. Furthermore, questionnaires provide large amounts of statistical information to enable comparisons between different groups and populations to be made; and large randomly selected samples can make results representative of wider society (McNeill & Chapman, 2005).

### **3.3 Research method**

To create three scales measuring attitudes and intentions towards abortion, adolescent parenthood and contraception amongst adolescent populations, data collected from a multiphase research project entitled the “Teen Relationships Study” (Skinner, 2005) were used. Before detailing the specific research method used in this doctoral research, a summary of the “Teen Relationships Study”, including information on the data collection process and study sample, is provided.

#### **3.3.1 Previous research project: The “Teen Relationships Study”**

The “Teen Relationships Study” was a mixed methods project exploring the biopsychosocial antecedents to adolescent pregnancy, and was conducted in Perth, Western Australia between 2006 and 2008 with adolescent samples. Ethics approval for the “Teen Relationships Study” was obtained from the King Edward Memorial Hospital Human Research Ethics Committee and the Western Australian Aboriginal Health Information and Ethics Committee. The “Teen Relationships Study” was conducted over two phases.

### 3.3.1.1 Phase one: The “Teen Relationships Study”

Phase one involved in-depth semi-structured interviews with adolescent participants to elucidate experiences surrounding romantic relationships, first sexual intercourse, sexual activity, contraception, pregnancy, abortion and motherhood. A purposive sample of 68 sexually active females aged 14-19 years was drawn from the metropolitan area of Perth, Western Australia. The sampling framework was structured to provide an array of experiences relating to pregnancy in three key areas: never pregnant, pregnant-continuing and pregnant-terminating. Recruitment sites included adolescent antenatal and postnatal clinics, pregnancy termination clinics, youth sexual health clinics and pastoral school services.

Research staff approached 14-19 year olds in clinic waiting rooms, or were introduced through an intermediary (e.g. nurse, youth worker). Written information relating to the study was provided to prospective participants and consenting participants were asked to provide contact information. The research staff then made a follow-up phone call several days later to arrange an interview. Written informed consent was obtained from all participants prior to interview commencement. Ethical requirements for parental consent were waived in instances where the participant had independently accessed sexual or reproductive services, demonstrated the cognitive ability to provide informed consent and where parental involvement presented a risk to the adolescent’s emotional, mental or physical well-being (Sanci, Sawyer, Weller, Bond, & Patton, 2004).

Interviews lasted between 45 to 90 minutes and were conducted in private by trained postgraduate research staff, most commonly in participant’s homes. All interviews were audio taped and transcribed verbatim. Whilst a framework of themes was established, informed by the research questions, interviewers asked open-ended questions and were encouraged to investigate interesting areas of dialogue. The interviews investigated the context, beliefs and experiences relating to romantic relationships, the initiation of sexual intercourse, general sexual behaviour, contraception and pregnancy.

Demographic information pertaining to the participants used in phase one of the “Teen Relationships Study” is provided in Table 3.1.

**Table 3.1**  
***Demographic Characteristics of Female Adolescents Participants Interviewed in Phase One of the “Teen Relationships Study” (n=68) (adapted from Skinner et al., 2009, p. 52)***

Characteristic	n	%
<b>AGE (YEARS)</b>		
14-15	8	12
16-17	36	53
18-19	24	35
<b>ETHNICITY</b>		
Caucasian	60	88
ATSI	8	12
<b>PREGNANCY STATUS</b>		
Never pregnant	12	18
Pregnant – terminated (first pregnancy)	21	31
Pregnant – continued (first pregnancy)		
Antenatal	16 <sup>a</sup>	23
Postnatal	19 <sup>b</sup>	28
<b>AGE FIRST COITUS (YEARS)</b>		
≤12	4	6
13-14	36	53
15-16	23	34
≥17	5	7
<b>AGE FIRST PREGNANCY (YEARS) (N=56)</b>		
≤15	15	27
16-17	32	57
≥18	9	16

<sup>a</sup> includes five ATSI participants

<sup>b</sup> includes three ATSI participants

Thematic analysis was performed on the narrative data and prominent themes were assembled to create a list of attitudinal and intention items. Further detail of the method used to obtain these data and some of the thematic findings have been published elsewhere (Skinner, Smith, Fenwick, Fyfe, & Hendriks, 2008; Skinner et al., 2009). The primary focus of the data analysis was to facilitate the development of a questionnaire, grounded in the qualitative data, to be implemented in the second phase of the study. However, additional analyses of the data have also been undertaken (J. Smith, 2011; J. Smith, S. R. Skinner, et al., 2011; J. Smith, Skinner, et al., 2012; J. Smith, Skinner, & Fenwick, 2013).

The attitude and intention items were piloted with a small number of adolescent females from each of the three groups (never-pregnant, pregnant-continuing, pregnant-terminating). This enabled researchers to check for comprehension and to gain feedback on a preferred format. Items were also tested for repetitiveness. Minor grammatical amendments were made following this initial pilot of the items. The final list of items is provided in Appendix A.

### 3.3.1.2 Phase two: The “Teen Relationships Study”

An extensive questionnaire was developed for the second phase of the “Teen Relationships Study.” It consisted of questionnaire items that had been used in other large-scale research projects (see below) and the attitude and intention items (Appendix A; n=70 male items, 95 female items) derived from the first phase of the study. In addition to collecting demographic information, the questions sought to obtain information on the following: individual factors (e.g. self-efficacy, perceived academic performance, personality characteristics), familial factors (e.g. family structure, relationship quality, monitoring of adolescent behaviour, communication between parent and adolescent about sex, parental education level, parental substance use) and extrafamilial factors (e.g. peer relationships, problem behaviours in peers, school connectedness, community and neighbourhood factors, social support, access to sexual and reproductive health services). Specific sexual behaviours were also self-reported (e.g. age of sexual debut, number of sexual partners in previous 12 months, contraceptive use, location of last sexual encounter, discussion about contraception at last sexual encounter).

Male and female versions of the questionnaire were produced, with females receiving additional questions dealing with their use of and attitudes toward hormonal contraception (n=429 male items, 448 female items). Both versions of the questionnaire were divided into 14 sections: personal details; school and education; work and income; family and household; male parent or carer; female parent or carer; general wellbeing; neighbourhood/community; general behaviour (use of cigarettes, alcohol and illicit drugs); friendships; romantic relationships; sexual attitudes (items derived from interviews conducted in phase one; Appendix A); sexual experiences; and pregnancy.

Except for the section on sexual attitudes, the majority of questionnaire items had been used in other large-scale adolescent research projects. These included the 2005 Australian Secondary Students’ Alcohol and Drug Survey (White & Hayman, 2006); the 3<sup>rd</sup> National Survey of Australian Secondary Students, HIV/AIDS and Sexual Health (A. M. A. Smith, Agius, Dyson, Mitchell, & Pitts, 2003); the 16-year follow-up of the Western Australian Pregnancy Cohort Study (McKnight et al., 2012; Newnham, Evans, Michael, Stanley, & Landau, 1993); and the Healthy Neighbourhoods Project (Centre for Adolescent Health, 2006). Previously validated measurement scales such as the Perceived Self-Efficacy Index (Cowen et al., 1991), the Rosenberg Self-Esteem Scale (Rosenberg, 1989) and the Strengths and Difficulties Questionnaire (Goodman, 1999) were also included.

The questionnaire was disseminated to three distinct populations: adolescents attending secondary schools, antenatal clinics or pregnancy termination services. Females were sampled at each site and males were sampled from secondary schools only.

Recruiting participants from antenatal and pregnancy termination clinics was a unique approach, specifically undertaken to ensure enough participants who had undergone an abortion or who had decided to continue with their pregnancy were sampled. If sampling had only been undertaken in school settings, the proportion of these individuals would have been substantially less, thereby limiting the statistical analyses that could be performed. This approach enabled a range of sexual experiences and pregnancy outcomes to be captured: not sexually active, sexually active – never pregnant, sexually active – pregnancy continuing and sexually active – pregnancy terminating. The sampling framework at each site differed slightly and shall now be described.

#### “Teen Relationships Study” phase two recruitment sites

##### *Secondary schools*

A two-stage sampling method was conducted to provide a sample of secondary students that encompassed different schooling types and a broad range of socioeconomic statuses. Firstly, all secondary schools within the Perth metropolitan area (N=147) were divided into different schooling sectors: government, Independent or Catholic. Secondly, using the Socio-Economic Index for Areas (SEIFA) developed by the Australian Bureau of Statistics (Australian Bureau of Statistics, 2008), schools from each sector were stratified into four SEIFA strata, based on the Index of Relative Socio-economic Disadvantage. Schools were randomly sampled from each stratum in numbers proportional to the target population and in a probability proportional to the size of the school. Replacement schools were randomly selected in the same manner to provide a list of schools that could be approached if the original school was unable to participate.

Once potential schools were identified, letters were forwarded to the school Principal introducing them to the study, providing them with brief background information and inviting their school to participate. Of the 23 schools who accepted the invitation to participate, the second stage of sampling involved the random selection of classes across years 9, 10 and 11, dependent on enrolment numbers. To determine the number of students to be approached at each year level the following rule was applied:

Number of students enrolled in a year	0-50	50-100	100-150	150-200
Number of classes approached:	<i>all students</i>	<i>two classes</i>	<i>three classes</i>	<i>four classes</i>

Several schools had an inclusive policy, requiring all students in a year level be approached.

Consent to participate in the study was sought from all students and their parents in the selected classes, including both male and female students. It was expected that some participants in this sample would report previous experiences of pregnancy, resulting in an abortion or live birth. Written informed consent was received from the school, the participant and the parent prior to dissemination of the questionnaire. The questionnaire was available in both paper and on-line formats. The method used was dependent on the computer facilities available at the school. Participants completed the questionnaire during school time under test-like conditions to ensure that they completed the survey individually. School staff did not participate and research staff were available to answer any questions. Completion time was 45-60 minutes.

#### *Antenatal clinics*

Participants were recruited from three clinic sites offering hospital or home-based antenatal and postnatal care to adolescents aged 18 years and under. Additional ethical approval was gained from these facilities if required. Research staff attended the clinics on a regular basis during the study period and approached most patients to ask for their participation. Participants provided written informed consent prior to commencing the questionnaire and parental consent was waived in instances where the participant was deemed to be a mature minor. Mature minors were those who had independently accessed clinic services, demonstrated the cognitive ability to provide informed consent and could demonstrate that parental involvement presented a risk to their emotional, mental or physical well-being (Sanci et al., 2004). Participants were provided with paper-based copies of the questionnaire and asked to complete it privately whilst waiting for their appointment. For those unable to complete the questionnaire in this time, a reply-paid envelope was provided and contact details collected so a follow-up phone call could be made if necessary.

#### *Pregnancy termination services*

Participants were recruited from three pregnancy termination clinics serving metropolitan Perth. Additional ethical approval was gained from these facilities if required. Research staff attended the clinics on a regular basis during the study period and approached most adolescent patients. On the day of the abortion procedure (the only time potential participants would present to the clinic) clinic staff asked the adolescent if they were willing to talk to the research officer in attendance. Where the adolescent consented, the research officer explained the purpose of the study and what participation would involve. Written



informed consent was received from the adolescent and any parent/guardian in attendance. Parental consent was again waived for mature minors. Consenting participants were provided with a paper-based copy of the questionnaire and a reply-paid envelope. They were asked to complete the questionnaire at home in private and to return it in a timely manner. Contact details were also collected so a follow-up phone call could be made if necessary.

#### “Teen Relationships Study” phase two sample

Questionnaires were received from 1681 participants. Of these, 1616 adolescents aged 12-19 years completed at least one of the attitude scales relating to this research (i.e. abortion, adolescent parenthood or contraception). Table 3.2 provides further information about the participants in terms of their age, gender, sexual history status, pregnancy history status and recruitment site.

**Table 3.2**  
***Demographic Characteristics of Respondents to Phase Two of the “Teen Relationships Study” (n=1616)***

Characteristic		n	%
<b>GENDER</b>			
Males		490	30.3
Females		1126	69.7
<b>AGE (YEARS)</b>			
≤13	Males	89	18.2
	Females	155	13.8
14-15	Males	359	73.3
	Females	601	53.4
≥16	Males	42	8.6
	Females	370	32.9
<b>RECRUITMENT SITE</b>			
Secondary school	Males	490	100.0
	Females	861	76.5
Antenatal clinic	Males	-	-
	Females	76	6.7
Pregnancy termination service	Males	-	-
	Females	189	16.8
<b>SEXUAL ACTIVITY STATUS<sup>a</sup></b>			
Not sexually active	Males	371	75.7
	Females	660	58.6
Sexually active	Males	116	23.7
	Females	459	40.8
<b>STATUS OF MOST RECENT PREGNANCY (FEMALES ONLY)<sup>b</sup></b>			
Never pregnant	Females	83	7.4
Pregnant – terminated	Females	192	17.1
Pregnant – continued/continuing	Females	76	6.7

<sup>a</sup> 3 males and 7 females provided no data on sexual activity status

<sup>b</sup> 108 sexually active females provided no data on pregnancy history

#### Phase two data storage and input

Data from the “Teen Relationships Study” exist as hard copies of questionnaires and consent forms; and as computer files. All data were stored at the University of Western Australia, School of Paediatrics and Child Health, as this was the research unit responsible for the project. Hard copies were stored in locked filing cabinets and electronic files were password protected and backed up to an on-site server.

The PhD candidate, as an Adjunct Research Fellow with the University of Western Australia (and previously employed as a research assistant for the project) was granted access to all data.

All on-line responses to the questionnaire were automatically coded and downloaded to a Microsoft Office Excel spreadsheet. Responses to the paper-based questionnaire were manually entered into the same spreadsheet. Once data collection ceased, results were transferred to various statistical software packages as required. All computer data records were de-identified.

### **3.3.2 Current research project**

The current research project used data collected in phase two of the “Teen Relationships Study.” The data storage arrangements that were previously mentioned continued to apply for this current research project.

In addition to the ethics approvals already mentioned, authorisation from the Curtin University Human Research Ethics Committee was also obtained. This approval included development of the attitude scales and subsequent statistical analyses conducted for the purposes of this doctoral research. The previously mentioned ethics committees were also informed of these additional analyses.

#### **3.3.2.1 Rasch analysis**

To address the first two research objectives, all responses to the attitude and intention items relating to abortion, adolescent parenthood and contraception<sup>2</sup> (Appendix A) were entered into the interactive computer program RUMM2030 (Andrich et al., 2008). This resulted in the development of three separate attitude scales: the “Adolescent Attitudes towards Abortion Scale”, the “Adolescent Attitudes towards Adolescent Parenthood Scale” and the “Adolescent Attitudes towards Contraception Scale.”

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<sup>2</sup> Survey items related to contraception included attitudes towards both barrier and hormonal methods.

Of the 1681 participants who submitted a questionnaire, 1616 participants completed at least one of the three scales (Table 3.2). In the development of each scale, participants who had only answered a few items were omitted<sup>3</sup>. The sample size was amended a second time to create equal-sized gender groups. This helped to ensure results were not weighted in favour of either sex group. Amendments to sample size are detailed specifically in the forthcoming chapters on each scale.

#### Fit statistics

Using the amended samples, threshold location checks and fit statistics were used to determine fit of data to the Rasch Model, and thus provide evidence of the internal consistency of each set of items. A detailed description of these processes was provided in the previous chapter. However, a brief summary is provided below.

#### *Thresholds*

A table of logit locations for each threshold point was examined to ensure locations increased sequentially. For each item, Category Characteristic Curves (CCC) were also examined to ensure response curves plotted from left to right in order of increasing agreement. Correctly ordered thresholds indicated that, for any item, the probability of selecting the most intense or desirable option (attitude) was more likely to occur amongst participants scoring higher on the scale overall.

Disordered thresholds were corrected post hoc one at a time, with the worst item corrected first. A threshold was corrected by collapsing or rescored the categories that were not operating correctly. Once one set of thresholds was corrected, the analysis was re-run and the thresholds checked. The next worst-performing item was then corrected and so on.

#### *Individual and overall item fit*

Fit of individual items to the Rasch Model was examined with three separate statistics.

Acceptable individual item log residual statistics are usually in a range of -2.5 to 2.5 (RUMM Laboratory, 2004). A negative fit residual indicates the item is over discriminating in relation to the discrimination of all items taken as a whole, and a positive value suggests the item is not discriminating well amongst persons.

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<sup>3</sup> It was reasoned that participants who had answered only a few items may have not taken the questionnaire seriously, thereby affecting the validity of the data. Such data, plus the presence of large amounts of missing data, would adversely affect the examination of the scaling properties of the items. Therefore they were deleted for the purpose of establishing the psychometric properties of the scales.

The item-trait interaction test of fit, a chi-square test, hypothesises that there is no difference between observed and theoretical values for a particular Item Characteristic Curve (ICC). A  $p < 0.05$  was taken to indicate a significant difference between observed and expected values, meaning the item showed misfit to the model.  $\chi^2$  values were expected to increase gradually in size but not be statistically significant.

Graphical inspection of ICCs was undertaken to examine fit between expected and observed values. Average responses of persons within each class interval were represented by a dot and expected values represented by a solid line. The requirement of good fit was that these points would be closely aligned.

In the same way thresholds were corrected one item at a time, misfitting items were assessed individually, starting with the worst performing item. This was because removal of one item may have affected the performance of other items. A misfitting item was commonly deleted after a broader consideration of possible reasons for misfit. For example, ambiguous item wording may have been a problem or the item may have been assessing something other than, or in addition to, the construct being measured by the items as a whole. Consideration of the construct, sample and test conditions may have explained why discrepancies between the model and the data were evident. Items with a small degree of misfit may have been retained if their importance could be established or if the misfit could be explained satisfactorily.

Overall fit of the items to the Rasch Model was examined by assessing the mean item log residual test of fit. For items to fit the model, the mean across all items was expected to be normally distributed ( $\bar{x} = 0$ ,  $SD = 1$ ). Overall misfit indicated that some items may be assessing something in addition to, or other than, attitudes towards abortion, adolescent parenthood or contraception; because the pattern of responses across all persons for an item was not consistent (or was too consistent).

#### *Local independence*

A correlation matrix of item residuals was examined to ensure the association between pairs of items was  $\leq 0.30$ . If high correlations were observed, this may indicate that item responses are not due to a participant's attitude towards abortion, adolescent parenthood or contraception; but is a result of their response to other items. In this instance, it is prudent to investigate the possibility of sub-scales and/or to remove misfitting items.

#### *Differential Item Functioning (DIF)*

An F-test of each item was performed to identify DIF, by determining if sub-group variances were equal. The presence of DIF was examined between males and females, sexually active and sexually inactive participants or amongst people with different pregnancy histories. Where uniform DIF was detected the item was split so that two or more items (one for each sub-group) were used in place of a single item and responses were analysed separately. For example, if an item demonstrated uniform DIF based upon gender, male responses for that item were examined separately to the female responses. Where non-uniform DIF was detected, items were deleted.

#### *Individual and overall person fit*

Fit of individual persons to the Rasch Model was assessed via person fit residuals. Log residual values greater than  $\pm 2.5$  indicated misfit. Negative values indicated a purer Guttman response pattern than expected, meaning the participant may have been responding to a fixed pattern of thinking (e.g. strongly agreeing to all items). Positive values indicated more disorder in responses than expected by the Rasch Model, possibly caused by carelessness or low motivation to respond. Both extremes were examined to determine whether to remove such persons from the sample.

Overall person fit was examined via the mean person log residual test of fit, and was expected to be normally distributed ( $\bar{x}=0$ ,  $SD=1$ ).

#### *Overall fit to the Rasch Model*

A statistically significant item trait interaction statistic (a chi-square test) indicated that items, overall, did not fit the model. Misfit indicated that some items were assessing something in addition to, or other than attitudes towards abortion, adolescent parenthood or contraception.

#### *Item/person distribution*

The person-item threshold distribution map was viewed to assess the targeting of items and persons along the same continuum. If individuals were located outside of the lowest or highest item thresholds, they would not be as reliably measured as persons who were targeted better to the items. For such persons, items would have been either too easy or difficult to respond to.

Means for different sub-groups (e.g. males and females, sexually active and inactive participants) were compared to establish whether they made sense intuitively.

### *Order and location of items*

Ideally item locations should be evenly distributed along the logit continuum and the ranked order of item difficulties should make sense intuitively.

### *Person Separation Index (PSI)*

Reliability of each scale was verified by the Person Separation Index (PSI). The PSI is the Rasch equivalent of a Cronbach's  $\alpha$  statistic and indicates whether a set of items could distinguish between people with varying attitudes towards the construct of interest.

### Unidimensionality

Fit to the Rasch model was taken as evidence that the scale items were unidimensional (B. D. Wright & Panchapakesan, 1969).

### Construct validity

Construct validity was established using Messick's (1989) principles of construct under-representation and construct-irrelevant variance. This required the removal of misfitting items (to ensure internal consistency of items); determining that the item difficulty hierarchy and comparative means for different sub-groups made theoretical sense; and that the person-item threshold distribution map demonstrated that items and persons were in close alignment.

### Item anchoring

Once each scale was finalised and its psychometric properties established as acceptable, the item locations derived from the amended sample sizes were then fixed and applied to the larger sample size of 1681 through a process of item anchoring (T. G. Bond & Fox, 2001; RUMM Laboratory, 2009; Wolfe, 2000),<sup>4</sup>. Person locations for all individuals were estimated using these item locations. Therefore, although investigation of the properties of the scale utilised a smaller sample, the anchored item locations were used to provide person locations for each participant in the original sample. Each participant in the study was assigned three separate person locations that denoted their attitude towards abortion, adolescent parenthood and contraception respectively. These person locations were then used in subsequent statistical analyses.

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<sup>4</sup> Whilst it was possible to derive scores for all participants (n=1681) a decision was made not to create scores for individuals who demonstrated limited engagement in the questionnaire. For example, in the abortion scale, participants who had answered fewer than three items were omitted, leaving a final sample size of 1478 for this scale. The specific sample sizes are addressed in greater detail over the proceeding chapters, where each scale is addressed separately.

### 3.3.2.2 Statistical analyses

To address the remaining research objectives, the Rasch-created linearised scale scores (person locations) were entered into PASW v18.0 (IBM SPSS Inc., 2009). For each of the three scales a series of descriptive, univariate and multivariable analyses were performed. A summary of these procedures is provided in Table 3.3.

Not all analyses could use the entire sample (e.g. items relating to sexual activity could not be answered by individuals who were not sexually active). Whilst every effort was made to use the largest sample possible, if a sub-sample was used, further description and justification is detailed within the following chapters.

#### Comparison of means

In order to best document and describe the attitudes of the adolescent sample, a series of mean person locations were compared. Means (reported in logits) were initially described for all cases using t-tests or one-way analysis of variance (ANOVA) as appropriate. For each gender, means were compared by both age and sexual activity status (sexually active vs. not sexually active). Amongst sexually active participants, means were compared for each gender by duration of sexual activity (<1 year vs. ≥1 year) and within selected RSB<sup>5</sup> variables. For sexually active females, means were compared across different pregnancy outcomes (never pregnant, pregnant–continuing or pregnant–terminating). Potential correlates (or explanatory variables) included demographic, individual, familial and extrafamilial variables. Variables relating to sexual behaviour and RSB were analysed for sexually active participants.

As previously mentioned, for sexually active participants, the duration of sexual activity was considered. This was to investigate whether adolescents who had only recently commenced sexual activity were different to their peers who had been sexually active for longer. A composite variable was created that encompassed gender and time since sexual debut (i.e. male-sexually active <1 year, male-sexually active ≥1 year, female-sexually active <1 year, female-sexually active ≥1 year). As many sexual behaviour items dealt with contraceptive behaviour, participants who had only engaged in oral sex were omitted when this composite variable was considered. Participants who did not provide their age of

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<sup>5</sup> As detailed in the literature review (Chapter Two), for the purposes of this research, risky sexual behaviours (RSBs) are those that place an individual at greater risk of an unplanned pregnancy or STI. These behaviours were commencement of sexual activity at an early age, failure to consistently and correctly use condoms or other contraceptives, a history of multiple sex partners, sexual activity whilst under the influence of drugs and/or alcohol or an unwanted sexual encounter. Any item from the “Teen Relationships” questionnaire that captured any of the abovementioned behaviours was considered in the analyses.

sexual debut were also omitted. At all other times, a participant was deemed to be sexually active if they had engaged in either oral sex or vaginal intercourse.

#### Adjusted univariate and multivariable linear regressions

For each scale, a predicted value of mean person location (i.e. a predicted scale score) was calculated based on a linear combination of independent explanatory variables. A series of univariate and multivariable regressions were undertaken to quantify the relative contribution of correlates. Output captured the specific level of change to the independent variable ( $\beta$ ; beta values) and the proportion of variation in the model explained by an individual variable ( $R^2$  change value) or all variables collectively ( $R^2$  value). A  $p$  (F change) value indicated the significance of variation in the model made by an individual variable; with statistical significance achieved when  $p < 0.05$ . Possible correlates included a broad range of individual, familial and extrafamilial factors; along with an adolescent's self-reported sexual behaviour and RSB.

In an effort to produce the most parsimonious and descriptive models possible, all regressions (including the univariate linear regressions) were adjusted for a series of factors. These included age, gender, ATSI status, sexual activity, sexual activity duration and recruitment site. Specific details about the adjustments made and justification for their selection is detailed within the following chapters. The adjusted factors were globally termed the *base model*.

The normality of all base models was checked graphically by plotting standardised residuals in histograms, P-P plots and against predicted variables. The Durbin-Watson test statistic (Durbin & Watson, 1950, 1951) was used to test whether correlate errors were independent.

If an explanatory variable demonstrated a significant difference ( $p < 0.05$ ) between comparative groups, it was individually tested in an adjusted univariate linear regression. Each univariate regression included the base model plus one explanatory variable. All variables demonstrating a significant ( $p < 0.05$ ) and reasonable contribution ( $R^2 > 1\%$ ) to the proportion of variability in mean attitude location were then considered collectively in an adjusted multivariable linear regression. Multivariable linear regressions again included the base model.

Even though a multivariable model considered multiple correlates, the final multivariable model consisted only of the correlates that remained significant ( $p < 0.05$ ) and made a



reasonable contribution ( $R^2 > 1\%$ ) to the proportion of variability in mean attitude location. Correlates outside of these parameters were not reported.

Once the final adjusted multivariable model for a particular attitude scale was derived, it was replicated with the addition of the two other scale scores to determine their combined effect. For example, once an adjusted multivariable model for the abortion scale was finalised, scale scores for the adolescent parenthood and contraception scales were added to investigate their potential influence.

The univariate and multivariable analyses considered:

- i. individual, familial and extrafamilial factors only (using all participants),
- ii. RSBs only (using only sexually active participants), and
- iii. individual, familial and extrafamilial factors, and RSBs combined (using only sexually active participants).

In the following chapters, each scale (abortion, adolescent parenthood and contraception) is addressed separately. These chapters detail the method and results for both the Rasch analysis and all statistical analyses. The final chapter integrates these results and responds to both the research objectives and the overall aim.

**Table 3.3**  
**Summary of Statistical Methods Undertaken Using Rasch-derived Locations for Each Research Objective**

Research objective	Sample <sup>a</sup>	Statistical method(s)	Potential explanatory variables
Document the attitudes and intentions of adolescents living in Perth, Western Australia in relation to their sexual histories.	All participants	t-tests or one-way ANOVA	<ul style="list-style-type: none"> <li>Age</li> </ul>
	All participants	t-tests or one-way ANOVA	<ul style="list-style-type: none"> <li>Variables addressing individual, familial and extrafamilial factors</li> </ul>
	Sexually active participants only	t-tests or one-way ANOVA	<ul style="list-style-type: none"> <li>Variables addressing individual, familial and extrafamilial factors</li> <li>Variables relating to sexual and contraceptive behaviour</li> </ul>
	Sexually active females only	t-tests or one-way ANOVA	<ul style="list-style-type: none"> <li>Different pregnancy experiences (never pregnant, pregnant–continuing, pregnant–terminating)</li> </ul>
Determine the effect of individual, familial and extrafamilial factors on attitudes and intentions.	All participants	Adjusted univariate linear regressions <sup>b</sup> Adjusted multivariable linear regressions <sup>c</sup>	<ul style="list-style-type: none"> <li>Variables addressing individual, familial and extrafamilial factors</li> </ul>
Determine whether adolescents who have engaged in risky sexual behaviour hold different attitudes and intentions from their peers who have not engaged in these behaviours.	Sexually active participants only	Adjusted univariate linear regressions <sup>b</sup> Adjusted multivariable linear regressions <sup>c</sup>	<ul style="list-style-type: none"> <li>Different risky sexual behaviours</li> </ul>
Determine the association between the scale scores and risky sexual behaviour when considering other individual, familial and extrafamilial factors.	Sexually active participants only	Adjusted univariate linear regressions <sup>b</sup> Adjusted multivariable linear regressions <sup>c</sup>	<ul style="list-style-type: none"> <li>Variables addressing individual, familial and extrafamilial factors</li> <li>Variables relating to sexual and contraceptive behaviour</li> <li>Different risky sexual behaviours</li> </ul>

<sup>a</sup> Not all analyses could use the entire sample (e.g. variables relating to sexual activity could not be answered by individuals who were not sexually active). Whilst every effort was made to use the largest sample possible, if a sub-sample was used, further description and justification is detailed within the results chapters.

<sup>b</sup> Significant correlates were tested in a series of adjusted univariate linear regressions. The level of adjustment made to each regression was dependent on the data being analysed. Factors that were adjusted for included age, gender, ATSI status, sexual activity, sexual activity duration and recruitment site. Adjusted factors were globally termed the base model. Univariate regressions considered the base model and one significant correlate at a time.

<sup>c</sup> Any correlate in an adjusted univariate linear regression that provided a significant ( $p < 0.05$ ) and reasonable contribution ( $R^2 > 1\%$ ) to the proportion of variability in mean attitude location was considered in an adjusted multivariable model. The level of adjustment made to each regression was dependent on the data being analysed. Factors that were adjusted for included age, gender, ATSI status, sexual activity, sexual activity duration and recruitment site. Adjusted factors were globally termed the base model. Multivariable regressions considered the base model and all correlates simultaneously. The final model reported only the correlates that provided a significant ( $p < 0.05$ ) and reasonable contribution ( $R^2 > 1\%$ ).

## CHAPTER 4

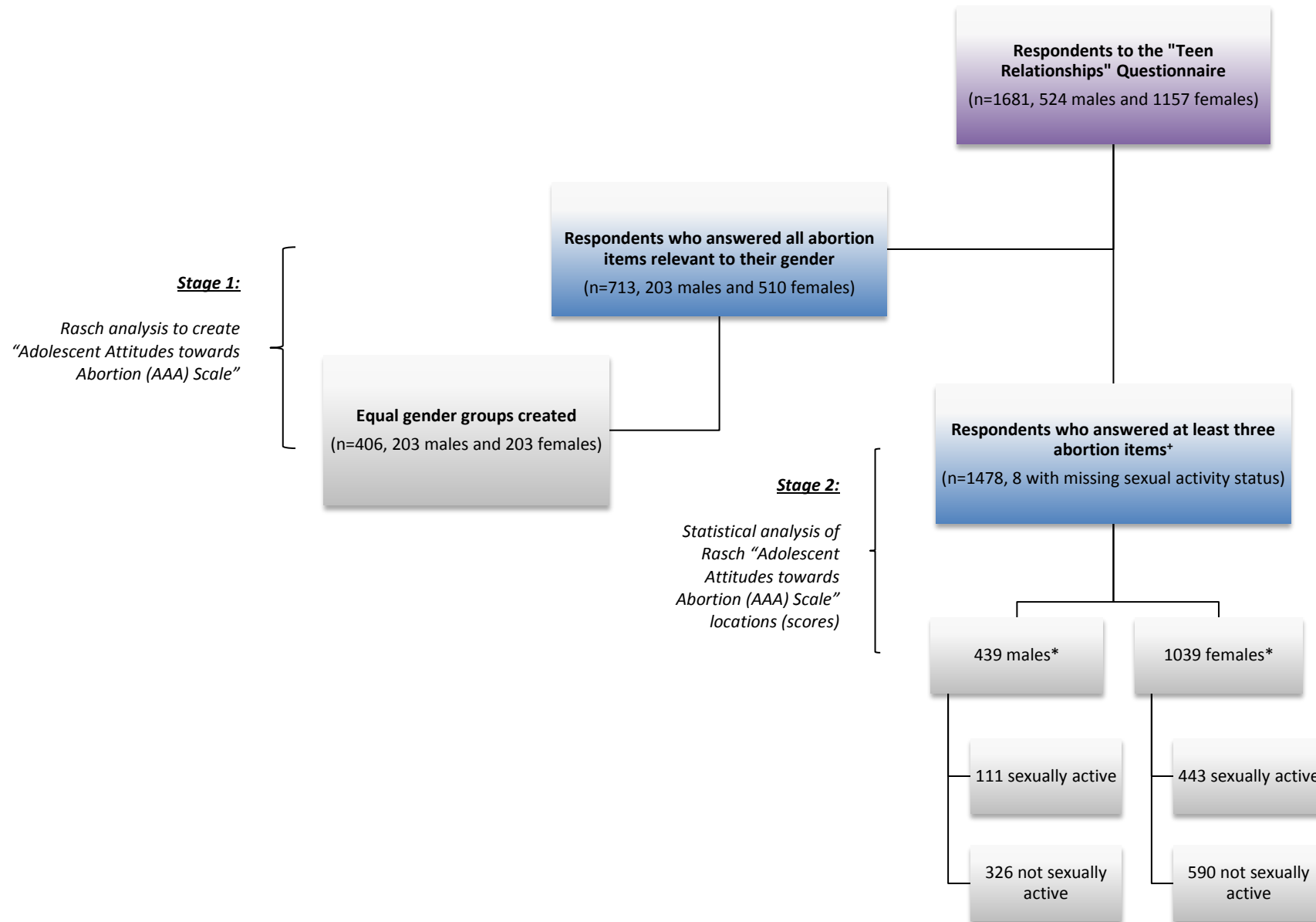
### *Development and Application of the “Adolescent Attitudes towards Abortion Scale”: Methods and Results*

## 4.0 Overview

This chapter details how the Rasch Unidimensional Measurement Model was used to select items to form a scale measuring adolescent attitudes towards abortion, and to examine the psychometric properties of that scale. Linear Rasch scores of abortion attitudes were created, with scores (person locations) subjected to traditional statistical analyses. These analyses sought to determine if abortion attitudes were associated with a series of possible explanatory variables. The methods and results relevant to these processes are detailed. Part of this chapter includes a published peer-reviewed journal article detailing how the Rasch Unidimensional Measurement Model was applied.

### 4.1 Statistical analysis pathway

Analysis of the abortion data occurred in two stages. A breakdown of the different sample sizes used for these analyses is provided in Figure 4.1. In stage one, the Rasch Unidimensional Measurement Model was applied to a subset of “Teen Relationships Study” data to create the “Adolescent Attitudes towards Abortion (AAA) Scale.” A score (termed a person location or location) measuring attitudes towards abortion was derived for each participant; with effort made to establish good construct validity and reliability for the scale. In stage two, traditional statistical analyses were applied to the Rasch-derived AAA Scale person locations to determine the association between these locations and a series of individual, familial or extrafamilial factors; or previous engagement in various RSBs.



**Figure 4.1. Sample sizes used for all data relating to abortion.**

\*item location values from Stage 1 were anchored to create person location values for all participants in Stage 2

\*sexual activity status missing for two males and six females

## 4.2 Stage 1: Rasch analysis of the “Adolescent Attitudes towards Abortion (AAA) Scale”

### 4.2.1 Method and Results

Using data obtained from the “Teen Relationships Study”, Rasch-derived linear locations of abortion attitudes were obtained. Development of the AAA Scale, including the method and results, is detailed in “Scale construction utilising the Rasch unidimensional measurement model: A measurement of adolescent attitudes towards abortion” (Hendriks et al., 2012) (Appendix B). The article provides a detailed explanation of the method and results (including the various output and fit statistics) relating to application of the Rasch Unidimensional Measurement Model.

Through Rasch analysis, a final nine-item scale assessing adolescent attitudes and intentions towards abortion was developed (Table 4.1). The response format for all items was a four-point Likert scale, consisting of the categories *strongly disagree*, *disagree*, *agree* and *strongly agree*; scored from 0 to 3 respectively. Items marked with an asterisk (\*) were reverse-scored. A higher location represented greater support for terminating a pregnancy.

**Table 4.1**

***Final List of Items for the AAA Scale (adapted from Hendriks et al., 2012, p. 258)***

	Item	Response categories	Location
B5	It is okay for a girl to have an abortion if she was raped and became pregnant	SD/D, A, SA	-0.798
G5	I would have an abortion if I was raped and became pregnant	SD, D, A, SA	-0.483
B2	I would want my partner to have an abortion if I wasn't ready to have a baby	SD, D, A, SA	-0.326
L10*	I don't believe in abortion	SD, D, A, SA	-0.206
L39*	My family does not agree with abortion	SD, D, A, SA	-0.04
L17	Abortion is a good option if you need to use it	SD, D, A, SA	0.074
G2	I would have an abortion if I wasn't ready to have a baby	SD, D, A, SA	0.315
L3	I would have an abortion if there was something wrong with the baby	SD, D, A, SA	0.628
G23	I would have an abortion if I didn't have a partner to support me	SD, D, A, SA	0.836

\*indicates items is reverse-scored

Items preceded by an L were asked of both males and females, B items were only given to boys only and G items to girls only

SD=strongly disagree, D=disagree, A=agree, SA=strongly agree

In an effort to examine local independence, item residual correlations were examined and showed no positive values. Two item pairs were negatively correlated; meaning an examination of sub-scales was not warranted.

### 4.2.2 Summary of AAA scale development

The Rasch Unidimensional Measurement Model was applied to data collected from the “Teen Relationships Study.” Removal of item L31 (*“I do not think abortion should be available”*) and rescoring of item B5 created a nine-item scale measuring adolescent attitudes towards abortion. The scale was entitled the “Adolescent Attitudes towards Abortion (AAA) Scale” and its measurement properties were examined through use of the software program RUMM2030 (Andrich et al., 2008).

For the AAA scale, and using Rasch analysis, reasonable internal consistency of the items (part of the evidence for construct validity) was established. This was achieved by deleting misfitting items; checking that the item difficulty hierarchy and mean person locations for different sub-groups made sense intuitively; and that the person-item threshold distribution map (Figure 8, Appendix B) demonstrated item locations and person locations to be closely aligned. However, the inclusion of items that target the more extreme abortion attitudes (i.e. either very pro-life or very pro-choice) could further improve the psychometric properties of the scale. Further Rasch analyses would be required to ensure the overall performance of an amended scale was not compromised.

The fit statistics indicated that the final set of items selected to form the scale provided an effective tool for the measurement of abortion attitudes. The scale was shown to be unidimensional and interval-level person locations (Rasch scores) of attitude were obtained.

## 4.3 Stage 2: Statistical analysis of Rasch AAA scale scores (locations)

### 4.3.1 Method

The Rasch-derived locations (n=406) were anchored<sup>6</sup> to produce a location for every person in the original sample of 1681 participants. This enabled an attitude location to be derived for all persons, even if they had not answered all the items relating to abortion. However, it was reasoned that participants who had answered fewer than three items in relation to

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<sup>6</sup> Through a process of item anchoring, Rasch analysis software allows the user to input known values (e.g. anchored item locations) so output (e.g. person locations) can be validly equated (T. G. Bond & Fox, 2001; RUMM Laboratory, 2009; Wolfe, 2000).

abortion showed limited engagement with the questionnaire and so these cases were omitted from the analysis.

Person locations were entered into PASW v18.0 (IBM SPSS Inc., 2009) for statistical analysis. Locations were relative, with a higher location indicating greater support for abortion. It is incorrect to assume that a location of zero equates to a neutral stance, and that a positive or negative location definitively indicates either support or opposition to abortion. Means for different groups were tested for significant differences using t-tests or one-way ANOVA as appropriate.

A predicted value of the AAA scale location for each person was calculated based on a linear combination of independent explanatory variables. A series of adjusted univariate and adjusted multivariable analyses were undertaken to quantify the relative contribution of correlates. The guidelines for these regressions were detailed in Chapter Three. All multivariable models were replicated with the addition of the two other Rasch locations (i.e. locations from the "Adolescent Attitudes towards Adolescent Parenthood Scale" and the "Adolescent Attitudes towards Contraception Scale").

### 4.3.2 Results

Figure 4.1 illustrates that, from the original sample of 1681 participants, anchoring of items produced an abortion attitude location for 1478 individuals, of whom 439 were male (111 sexually active, 326 not sexually active) and 1039 were female (443 sexually active, 590 not sexually active). Data on sexual activity status were absent for two males and six females.

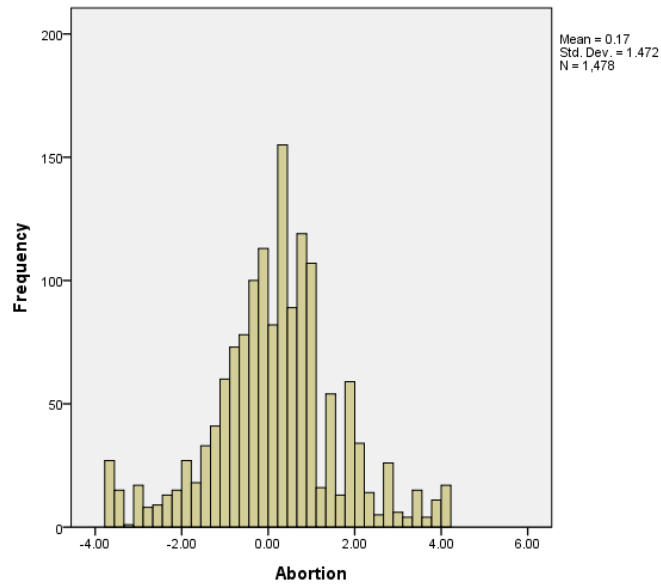
Table 4.2 details the measures of central tendency for the AAA scale locations. For all participants the mean scale location was 0.17 logits (SD=1.47). Whilst the range was broad (R=-3.76-4.21), it narrowed when extreme values were removed (R=-2.94-3.34). The difference in mean scores between males and females was not statistically significant ( $p=0.144$ ).

**Table 4.2**  
***Measures of Central Tendency for AAA Scale Locations (n=1478)***

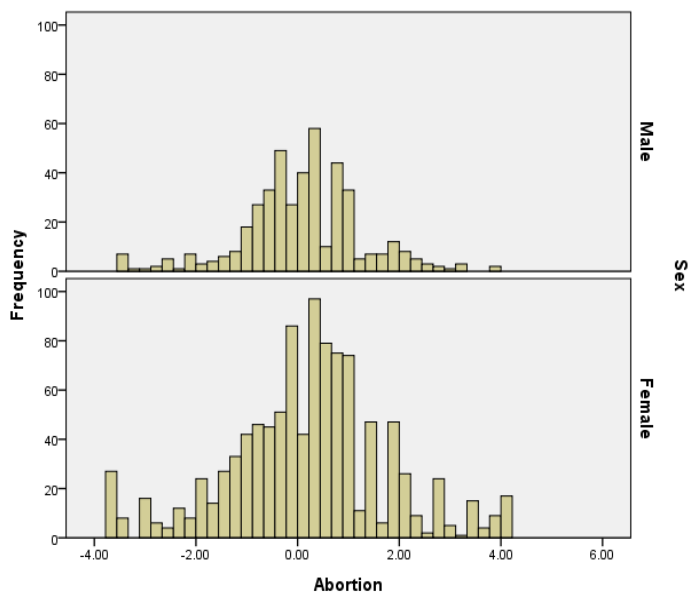
	n	Mean (SD)	Median (IQR)	Min-Max
<b>All participants</b>	1478	0.17 (1.47)	0.24 (-0.62, 0.97)	-3.76, 4.21
<b>Males</b>	439	0.08 (1.17)	0.06 (-0.50, 0.71)	-3.44, 3.85
<b>Females</b>	1039	0.21 (1.58)	0.24 (-0.69, 1.09)	-3.76, 4.21



Histograms (Figures 4.2-4.3) and a quantile-quantile (Q-Q) plot (Figure 4.4) show that the person locations appeared to be close to a normal distribution, meaning no data transformation was required.



**Figure 4.2.** Distribution of AAA scale locations for all participants (n=1478).



**Figure 4.3.** Distribution of AAA scale locations for all males (n=439) and females (n=1039).

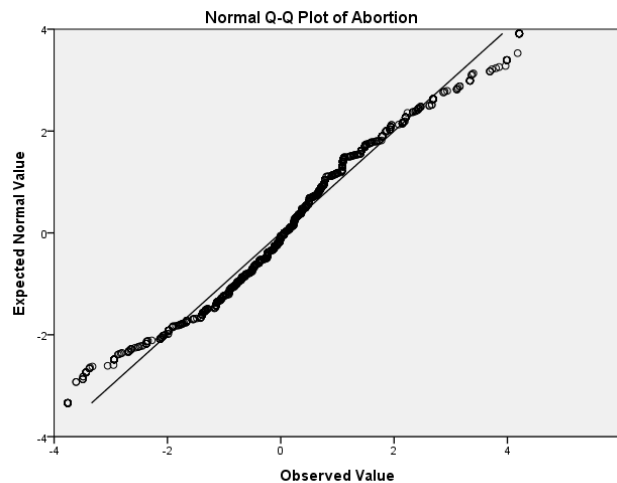


Figure 4.4. Q-Q Plot of AAA scale locations.

### 4.3.2.1 Comparative means of AAA scale locations

#### Attitudes towards Abortion by age (males and females separately)

Table 4.3 provides the mean scale locations for the AAA scale across different age groupings. For both genders, support for abortion was highest amongst the older age groups. However, this finding was only statistically significant for females (males  $p=0.817$ , females  $p<0.001$ ).

**Table 4.3**

*Rasch Mean AAA Scale Locations (Comparisons by Age within Gender) (n=1478)*

	Mean (SD)	p
MALES		
≤13 years	0.04 (1.37)	0.817
14-15 years	0.09 (1.10)	
≥16 years	0.19 (1.33)	
FEMALES		
≤13 years	-0.16 (1.42)	<0.001
14-15 years	0.07 (1.50)	
≥16 years	0.57 (1.70)	

#### Attitudes towards Abortion by sexual activity status (males and females separately)

Within each gender, the mean locations of sexually active participants were compared to those of non-sexually active participants. As data on sexual activity status were absent for two males and six females, the sample size for this analysis was 1470. Results are provided in Appendix C (Table C.1), with statistically significant differences ( $p<0.05$ ) highlighted.

Overall, sexually active participants showed greater support for abortion than those who were not sexually active. This was true for both males (not sexually active=-0.05, sexually

active=0.48,  $p<0.001$ ) and females (not sexually active=-0.13, sexually active=0.67,  $p<0.001$ ) and occurred across all age groups (although a significant difference was not found amongst sexually active and inactive males aged 16 years or over;  $p=0.124$ ).

Sexual activity was associated with more supportive abortion attitudes regardless of religious affiliation. This finding was statistically significant across most variables tested.

The education and working status of parents was not associated with support for abortion. Amongst males and females, sexually active participants continued to show the greatest support for abortion. In instances where this trend was reversed (i.e. for males whose mothers did not work or possessed limited schooling), the differences were not statistically significant.

Variables relating to alcohol and other drug use, family functioning, neighbourhood, school, friendships and romantic relationships were all investigated. Data from Cowen's Personal Self-Efficacy Scale (Cowen et al., 1991), the Rosenberg Self-Esteem Scale (Rosenberg, 1989) and the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1999) were also included. Irrespective of what correlates were used, excluding self-efficacy, sexual activity continued to be associated with greater support for abortion; with the majority of comparisons being statistically significant. However, amongst females with a normal self-efficacy score on Cowen's Personal Self-Efficacy Scale (Cowen et al., 1991), those who were not sexually active were more supportive of abortion than those who were sexually active (0.74 for non-sexually active females, 0.20 for sexually active females,  $p<0.001$ ).

Sexually active participants were more supportive of abortion regardless of their sexual orientation, non-penetrative sexual behaviour, or desire to become an adolescent parent. However, the reverse scenario was true for males who self-identified as bi-sexual or homosexual, and for males with a desire to be an adolescent parent. Where the reverse scenario was present (i.e. sexually active participants were less supportive of abortion) it is important to note that mean difference in locations for these particular variables were not significant and that the number of cases was limited.

Amongst females who did not want to become a parent in the near future, sexually active participants exhibited a support for abortion that was noticeably larger than their non-sexually active peers (-0.08 for not sexually active vs. 1.09 for sexually active,  $p<0.001$ ).

#### Attitudes towards Abortion by sexual activity duration (sexually active males and females separately)

By considering sexually active participants separately, potential explanatory variables relating to sexual and contraceptive behaviour could be considered; this was in addition to investigating the same selection of individual, familial and extrafamilial variables used previously. The composite variable of sexual activity duration (i.e. sexually active <1yr or sexually active ≥1yr) reduced the sample for this analysis. Only 60 (out of 111) sexually active males and 367 (out of 443) sexually active females had provided duration data and engaged in vaginal intercourse.

Results are provided in Appendix C (Table C.2) and significant differences are highlighted ( $p < 0.05$ ).

Amongst males, the general trend was for support towards abortion to be highest amongst those who had been sexually active for one or more years. However, when examining this relationship in the presence of specific variables, the mean difference in AAA Scale location was statistically significant in only a few instances (as highlighted in Table C.2). Where participants reported any of the following: *"father drinks alcohol," "current relationship status – committed/engaged"* or *"has never used condoms in the last 12 months,"* males who had been sexually active for longer showed a support for abortion that was markedly and significantly higher (i.e. difference in logit locations  $> 1.5$ ).

Amongst females, the overall trend was for support towards abortion to be highest amongst participants who had only recently commenced sexual activity. Like the male findings, most differences in mean AAA Scale location were not statistically significant (as highlighted in Table C.2), although the number of variables where a significant mean difference was found was slightly higher.

#### Attitudes towards Abortion by risky sexual behaviour (sexually active participants)

Table 4.4 details the mean abortion attitude locations within selected RSB categories, for all sexually active participants. For each RSB category, the riskiest behaviour is listed first.

**Table 4.4****Rasch Mean AAA Scale Locations for Sexually Active Participants (Comparisons within RSB Categories)**

Note: Riskier behaviour is listed first

Note: Riskier behaviour is listed first				
Correlate		n	Mean (SD)	p
COMMENCEMENT OF SEXUAL ACTIVITY AT AN EARLY AGE				
Age at sexual debut (vaginal intercourse)	≤15	327	0.58 (1.46)	<0.001
	≥16	100	1.20 (1.42)	
Age at sexual debut (oral sex or vaginal intercourse)	≤15	436	0.59 (1.44)	0.007
	≥16	86	1.05 (1.48)	
FAILURE TO CONSISTENTLY USE CONDOMS OR OTHER CONTRACEPTIVES				
Contraception used in past ever	No	54	0.55 (1.49)	0.660
	Yes	500	0.64 (1.45)	
Contraception used last time had sex	No	155	0.57 (1.61)	0.551
	Yes	398	0.65 (1.38)	
Oral contraceptive pill used in past ever	No	404	0.55 (1.46)	0.037
	Yes	150	0.84 (1.41)	
Oral contraceptive pill used last time had sex	No	496	0.57 (1.44)	0.004
	Yes	57	1.15 (1.42)	
Condoms used in past ever	No	229	0.34 (1.39)	<0.001
	Yes	325	0.83 (1.46)	
Condoms used in past year	Never	62	0.84 (1.65)	0.457
	Sometimes	217	0.71 (1.55)	
	Always	125	0.78 (1.55)	
	Sometimes/never	279	0.74 (1.57)	0.792
	Always	125	0.78 (1.57)	
Condoms used last time had sex	No	224	0.80 (1.57)	0.400
	Yes	202	0.68 (1.35)	
A HISTORY OF MULTIPLE SEX PARTNERS				
Number of oral sex partners in past year	≥3	114	0.86 (1.52)	<0.001
	1-2	345	0.66 (1.44)	
	0	91	-0.08 (1.42)	
Number of vaginal intercourse partners in past year	>1	315	0.59 (1.43)	0.438
	1	239	0.69 (1.48)	
	≥3	105	0.79 (1.37)	0.795
	2	70	0.77 (1.54)	
	1	239	0.69 (1.48)	
Number of sexual partners in past year (oral sex or vaginal intercourse)	≥3	151	0.79 (1.53)	<0.001
	1-2	362	0.61 (1.44)	
	0	42	-0.09 (1.41)	
SEXUAL ACTIVITY WHILST UNDER THE INFLUENCE OF DRUGS AND/OR ALCOHOL				
Drunk or high last time had sex	Yes	66	0.96 (1.60)	0.190
	No	358	0.70 (1.44)	
UNWANTED SEXUAL ENCOUNTER				
Ever had unwanted sex	Yes	157	0.81 (1.47)	0.315
	No	279	0.67 (1.45)	

Individuals commencing sexual activity at a later age ( $\geq 16$  years) demonstrated greater support for abortion ( $p < 0.001$ ).

Participants who self-reported using the oral contraceptive pill in the past ( $p = 0.037$ ) or during their last sexual encounter ( $p = 0.004$ ) were more supportive of abortion than their peers who did not report these behaviours. Similarly, participants who self-reported ever having used condoms were more supportive of abortion ( $p < 0.001$ ).

In relation to the number of sexual partners, the overall trend was for participants with the greatest number of partners in the past year (oral or vaginal) to be more supportive of abortion ( $p < 0.001$ ).

Being drunk or high at last sexual encounter ( $p = 0.190$ ), or a previous unwanted sexual encounter ( $p = 0.315$ ) was not associated with abortion attitude.

#### Attitudes towards Abortion by pregnancy outcome (sexually active females)

Table 4.5 illustrates that, across three different categories of pregnancy history, support for abortion was lowest amongst females who had continued with a pregnancy ( $-0.72$ ); with sexually active females who had never been pregnant being more supportive of abortion ( $0.55$ ) and those reporting a previous termination showing the greatest level of support ( $1.36$ ,  $p < 0.001$ ).

**Table 4.5**

*Rasch Mean AAA Scale Locations for Sexually Active Females (Comparisons by Pregnancy History) (n=443)*

	%	Mean (SD)	p
<b>PREGNANCY STATUS</b>			
Sexually active never pregnant	39	0.55 (1.43)	
Sexually active pregnant terminated	44	1.36 (1.18)	
Sexually active pregnant continued	17	-0.72 (1.49)	<0.001

Table C.3 (Appendix C) highlights the mean locations for all sexually active females ( $n = 443$ ). Comparisons were made by history of abortion. Across the vast majority of variables tested, a significant difference in locations was detected, with females who had undergone a termination being more supportive of abortion.

### 4.3.2.2 Linear regressions

#### Individual, familial and extrafamilial factors only (all participants)

##### *Linear regression models adjusting for gender, age, ATSI status, sexual activity and recruitment site*

In this analysis, the base model (for both univariate and multivariable regressions) accounted for gender, age, ATSI status, recruitment site<sup>7</sup> and sexual activity. A selection of significant variables (correlates) from Table C.1 was tested univariately in a series of adjusted linear regression models (Table C.5, Appendix C).

Table C.5 indicates that several correlates made a significant variation in an adjusted univariate model. However, only the “*religious affiliation=Christianity*” and “*participated in youth group activities during last 12 months*” variables made a significant and reasonable contribution to the proportion of variability in mean abortion attitude location; meaning they were considered in an adjusted multivariable model. Table 4.6 shows that both correlates continued to make a reasonable and significant contribution to the proportion of variability (>1%). The variable “*religious affiliation=Christianity*” ( $\beta=-0.438$ ,  $p<0.001$ ) contributed 2.9% of model variation and “*participated in youth group activities during last 12 months*” ( $\beta=-0.439$ ,  $p<0.001$ ) contributed 1.7%. The beta values for these correlates indicated that their presence was associated with reduced support for abortion.

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<sup>7</sup> The decision to adjust for recruitment site (i.e. secondary school, antenatal clinic or termination service) was taken after reviewing the difference in mean locations across each site. Table C.4 in Appendix C details the mean AAA Scale locations for each recruitment site. As all males were recruited from secondary schools, this analysis related to females only (n=1039). Across the vast majority of correlates selected, the trend was for females recruited from a termination service to be the most supportive of abortion, followed by females recruited from secondary schools. Females recruited from antenatal clinics were the least supportive. Whilst it is beneficial to regard the recruitment sites as three distinct groups of pregnancy outcomes (i.e. never pregnant, pregnancy continuing and pregnancy terminating), it is important to note that the recruitment site did not directly correlate with pregnancy outcomes and a small degree of crossover between groups does exist. Participants recruited from an antenatal clinic may have undergone a previous termination and participants recruited from a termination clinic may have reported previous pregnancies resulting in a live birth. Similarly, secondary school students may or may not have been sexually active, and may or may not have reported a previous pregnancy.

Of the complete sample of 1681 participants, a final scale location for at least one of the three scales (i.e. abortion, adolescent parenthood or contraception) was derived for 1616 participants. In this sample, 38 participants (2.4%) had experienced more than one pregnancy with various outcomes. Therefore, whilst adjusting for recruitment site was less preferable, adjusting for pregnancy history proved to be too complex.

**"Table 4.6****AAA Scale Adjusted Multivariable Linear Regression Model (Comparisons by Sexually Active Status for each Gender)**

n=1450	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.136</b>		<b>&lt;0.001</b>
Age	0.002		0.037				
ATSI	0.041		0.176				
+Female – sexually active, termination service	1.339		0.149				
+Female – sexually active, antenatal clinic	-0.765		0.189				
+Female – sexually active, secondary school	0.560		0.117				
+Male – sexually active	0.497		0.141				
+Male – not sexually active	0.030		0.094				
Religious affiliation = Christianity	-0.438	-0.582, -0.294	0.074	<0.001	0.165	0.029	<0.001
Participated in youth group activities during last 12 months	-0.439	-0.595, -0.356	0.080	<0.001	0.182	0.017	<0.001

Note: Variables considered in the model were "**religious affiliation=Christianity**" and "**participated in youth group activities during last 12 months.**" Items in bold were retained in the model ( $R^2 > 1\%$ ,  $p < 0.05$ ).

Reference category: Female – not sexually active

Attitudes towards adolescent parenthood and contraception (i.e. the two other Rasch-derived person locations) were then included in the multivariable mode (Table 4.7).

Correlations between abortion attitude location and the two other Rasch-derived locations are provided in Appendix F. Adolescent attitudes towards parenthood contributed 5.7% of model variation ( $\beta = 0.306$ ,  $p < 0.001$ ). Adolescent Attitudes towards Contraception contributed less than 1% and was therefore removed from the model.

**Table 4.7****AAA Scale Adjusted Multivariable Linear Regression Model (Comparisons by Sexually Active Status for each Gender, plus Addition of Other Rasch-derived Locations)**

n=1307	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.140</b>		<b>&lt;0.001</b>
Age	0.026		0.036				
ATSI	0.033		0.171				
+Female – sexually active, termination service	1.201		0.146				
+Female – sexually active, antenatal clinic	-0.237		0.192				
+Female – sexually active, secondary school	0.481		0.115				
+Male – sexually active	0.579		0.139				
+Male – not sexually active	0.041		0.099				
Religious affiliation = Christianity	-0.480	-0.622, -0.337	0.073	<0.001	0.167	0.028	<0.001
Participated in youth group activities during last 12 months	-0.441	-0.596, -0.286	0.079	<0.001	0.187	0.020	<0.001
Adolescent Attitudes towards Adolescent Parenthood score	0.306	0.249, 0.363	0.029	<0.001	0.244	0.057	<0.001

Note: Variables considered in the model were "**religious affiliation=Christianity**," "**participated in youth group activities during last 12 month**," "**Adolescent Attitudes towards Adolescent Parenthood score**" and "**Adolescent Attitudes towards Contraception score.**" Items in bold were retained in the model ( $R^2 > 1\%$ ,  $p < 0.05$ ).

Reference category: Female – not sexually active



*Separately for each gender, linear regression models adjusting for age, ATSI status and sexual activity*

The same analysis process was repeated for males and females separately. Due to the limited number of male cases that would have resulted, the base model did not account for recruitment site or sexual activity duration. By accounting for sexual activity only, males and females could be analysed equally. Therefore, for these analyses the base model (for both univariate and multivariable regressions) accounted for age, ATSI status and sexual activity.

*Male linear regression models*

Tables C.6 and C.7 (Appendix C) provide the results of the adjusted univariate and multivariable regressions for the male sample. The significant correlates from Table C.1 formed the basis of these analyses. Amongst males, the final multivariable model considered the variables: *"English=main language," "religious affiliation=Christianity," "mother works," "mother drinks alcohol," "father drinks alcohol," "ever drunk alcohol" and "parents would find out if drank alcohol"* (Table C.7). A positive beta value indicated that the presence of variable was associated with greater support for abortion and vice-versa. The variables *"English=main language"* ( $\beta=1.706$ ,  $R^2$  change=0.021,  $p=0.006$ ), *"religious affiliation=Christianity"* ( $\beta=-0.433$ ,  $R^2$  change=0.040,  $p<0.001$ ), *"ever drunk alcohol"* ( $\beta=0.384$ ,  $R^2$  change=0.012,  $p=0.031$ ) and *"parents would find out if drank alcohol"* ( $\beta=-0.394$ ,  $R^2$  change=0.029,  $p=0.001$ ) remained in the final model. Adding the parenthood and contraception Rasch locations into the model had no effect.

*Female linear regression models*

Tables C.8 – C.9 (Appendix C) provide the results of the adjusted univariate and multivariable regressions for the female sample. Like the males, the significant correlates from Table C.1 formed the basis of these analyses. Amongst females, the following significant variables demonstrated an  $R^2$  value  $>1\%$ : *"religious affiliation=Christianity," "participated in youth group activities during last 12 months" and "prior history of abortion"* (Table C.8). When these variables were all considered in the same adjusted multivariable model (Table C.9), a prior history of abortion was the only variable that remained and it contributed to 14.5% model variation ( $\beta=1.397$ ,  $p<0.001$ ). It was associated with greater support for abortion. When this factor was removed, and only religiosity and youth group participation were considered (Table C.10), the presence of these correlates was associated with reduced support for abortion and contributed to 1.3% ( $\beta=-0.383$ ,  $p<0.001$ ) and 3.8% ( $\beta=-0.619$ ,  $p<0.001$ ) of model variation respectively.

Tables C.11 and C.12 (Appendix C) present the same multivariable regressions, this time with the addition of the parenthood and contraception Rasch person locations. When all variables were considered in unison (Table C.11) a prior history of abortion contributed to 14.5% of model variation ( $\beta=0.901$ ,  $p<0.001$ ) and the adolescent parenthood attitude location contributed 20.2% ( $\beta=0.476$ ,  $p<0.001$ ). When a prior history of abortion was not considered (Table C.12), more correlates remained in the model: "*Christianity*" ( $\beta=-0.469$ ,  $R^2$  change=0.010,  $p=0.002$ ), "*youth group participation*" ( $\beta=-0.582$ ,  $R^2$  change=0.038,  $p<0.001$ ), "*contraception attitude location*" ( $\beta=-0.250$ ,  $R^2$  change=0.015,  $p<0.001$ ) and "*adolescent parenthood attitude location*" ( $\beta=0.449$ ,  $R^2$  change=0.131,  $p<0.001$ ).

#### Risky sexual behaviours only (sexually active participants)

##### *Linear regression models adjusting for age, gender and ATSI status*

The significant correlates from Table 4.4 were tested individually in a linear regression model, with the results presented in Table 4.8. Adjustments were made for age, gender and ATSI status.

**Table 4.8**

**AAA Scale Adjusted Univariate Linear Regression Models for Sexually Active Participants (Comparisons within RSB Categories)**

	B	SE(B)	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>			<b>0.028</b>		<b>&lt;0.001</b>
Age	0.184	0.029			
ATSI	-0.177	0.186			
+Male – sexually active	0.019	0.026			
<b>Plus (added individually):</b>					
Age at sexual debut (vaginal intercourse)	0.572	0.182	0.062	0.022	0.002
Age at sexual debut (oral sex or vaginal intercourse)	0.397	0.184	0.040	0.009	0.031
Oral contraceptive pill used in past ever	0.151	0.149	0.035	0.002	0.311
Oral contraceptive pill used last time had sex	0.492	0.201	0.044	0.010	0.015
Condoms used in past ever	0.488	0.128	0.058	0.025	<0.001
Number of sexual partners in past year (oral sex or vaginal intercourse)	0.463	0.064	0.062	0.034	<0.001
Number of oral sex partners in past year	0.498	0.068	0.063	0.035	<0.001

Note: Variables entered individually in addition to the Base model. Variables were not tested if they were not found to be statistically significant in Table 4.4

Reference category: Female – sexually active

Most variables made a significant and reasonable (>1%) contribution to the prediction of an abortion attitude location. All correlates increased the mean abortion attitude location, as evidenced by the positive beta values. As such, "*age at sexual debut (vaginal intercourse)*," "*condoms used in past ever*," "*number of sexual partners in past year (oral sex or vaginal intercourse)*" and "*number of oral sex partners in past year*." were placed into an adjusted multivariable model (Table 4.9).

**Table 4.9****AAA Scale Adjusted Multivariable Linear Regression Model for Sexually Active Participants (Comparisons within RSB Categories)**

n=427	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.040</b>		<b>&lt;0.001</b>
Age	-0.005		0.055				
ATSI	-1.025		0.263				
+Male – sexually active	0.006		0.218				
Age at sexual debut (vaginal intercourse) = ≥16	0.549	0.194, 0.904	0.158	0.003	0.062	0.022	0.003
Condoms used in past ever	0.385	0.081, 0.689	0.118	0.013	0.075	0.014	0.011

Note: Variables considered in the model were "age at sexual debut (vaginal intercourse)," "condoms used in past ever," "number of sexual partners in past year (oral sex or vaginal intercourse)" and "number of oral sex partners in past year." Items in bold were retained in the model ( $R^2 > 1\%$ ,  $p < 0.05$ ).

Reference category: Female – sexually active

Only two correlates remained in the model. Having delayed vaginal intercourse until 16 years or later ( $\beta = 0.549$ ,  $R^2$  change = 0.022,  $p = 0.003$ ) and a past history of having used condoms ( $\beta = 0.385$ ,  $R^2$  change = 0.014,  $p = 0.011$ ), both affected mean AAA Scale location, and meant a participant was more supportive of abortion.

Table 4.10 show the same adjusted multivariable regression, this time with the addition of the parenthood and contraception Rasch locations. When all variables were considered in unison, data relating to age of sexual debut and use of condoms remained largely unchanged (delaying vaginal intercourse until 16 years or later:  $\beta = 0.117$ ,  $R^2$  change = 0.022,  $p = 0.002$ ; a past history of having used condoms:  $\beta = 0.210$ ,  $R^2$  change = 0.013,  $p = 0.014$ ). However, a participant's response to the Parenthood scale contributed to 33.2% of model variation ( $\beta = 0.593$ ,  $p < 0.001$ ).

**Table 4.10****AAA Scale Adjusted Multivariable Linear Regression Model for Sexually Active Participants (Comparisons within RSB Categories, plus Addition of Other Rasch-derived Locations)**

n=427	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.038</b>		<b>&lt;0.001</b>
Age	0.083		0.045				
ATSI	-0.629		0.216				
+Male – sexually active	0.006		0.218				
Age at sexual debut (vaginal intercourse) = ≥16	0.117	-0.175, 0.409	0.149	0.432	0.061	0.022	0.002
Condoms used in past ever	0.210	-0.041, 0.462	0.128	0.101	0.074	0.013	0.014
Attitudes towards Adolescent Parenthood score	0.593	0.518, 0.668	0.038	<0.001	0.406	0.332	<0.001

Note: Variables considered in the model were "age at sexual debut (vaginal intercourse)," "condoms used in past ever," "Attitudes towards Adolescent Parenthood score" and "Adolescent Attitudes towards Contraception score." Items in bold were retained in the model ( $R^2 > 1\%$ ,  $p < 0.05$ ).

Reference category: Female – sexually active

Individual, familial and extrafamilial factors, and risky sexual behaviours combined (sexually active females)

*Linear regression models adjusting for age, ATSI status, and sexual activity duration*

The final set of linear regressions considered all individual, familial and extrafamilial factors in addition to RSB; adjusted for age, ATSI status and sexual activity duration. Male cases were removed due to the low number of cases that could provide sexual duration data (n=60).

Table 4.11 details the adjusted univariate linear regression models for females only. A selection of significant correlates from Table C.2 was tested univariately. The base model contributed to 5.2% of model variation before the addition of correlates.

**Table 4.11**  
**AAA Scale Adjusted Univariate Linear Regression Models for Sexually Active Females (Comparisons by Duration of Sexual Activity)**

		B	SE(B)	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>				<b>0.052</b>		<b>&lt;0.001</b>
Age		0.131	0.055			
ATSI		-1.028	0.212			
+Female – sexually active ≥1year		-0.401	0.218			
<b>Plus (added individually):</b>						
Number homes lived in:	1-3	0.546	0.137	0.069	0.017	0.010
	4-6	0.254	0.189	0.074	0.004	0.198
Participated in youth group activities during last 12 months		-0.395	0.199	0.061	0.010	0.047
Friendships important		0.476	0.199	0.068	0.015	0.017

Note: Variables entered individually in addition to the Base model. Variables were not tested if they were not found to be statistically significant in Table C.2

Whilst a broad range of variables were tested, only the significant variables with an R<sup>2</sup> change >1% are listed

Reference category: Female – sexually active <1year

From all the univariate regressions performed, only “*number of homes lived in=1-3,*” “*participated in youth group activities during the last 12 months*” and “*friendships are important*” remained statistically significant (Table 4.11). These correlates were then entered into the final adjusted multivariable model.

Table 4.12 details the final multivariable model for females. Adjustments were again made for age, ATSI status and sexual activity duration. The base model accounted for 5.2% of model variation. Regarding friendships as important accounted for 1.6% of model variation ( $\beta=0.457$ ,  $p=0.014$ ), having lived in three or less homes accounted for 1.3% ( $\beta=0.372$ ,  $p=0.024$ ) and youth group participation 1.1% ( $\beta=-0.391$ ,  $p=0.047$ ).

**Table 4.12**

**AAA Scale Adjusted Multivariable Linear Regression Model for Sexually Active Females (Comparisons by Duration of Sexual Activity)**

n=355	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.052</b>		<b>&lt;0.001</b>
Age	0.144		0.039				
ATSI	-0.712		0.218				
+Female – sexually active ≥1year	-0.376		0.216				
Participated in youth group activities during last 12 months	-0.391	-0.781, 0.000	0.199	0.050	0.062	0.011	0.047
Friendships important	0.457	0.063, 0.851	0.200	0.023	0.079	0.016	0.014
Number of homes lived in = 1-3	0.372	0.048, 0.695	0.164	0.024	0.092	0.013	0.024

Note: Variables considered in the model were **"number of homes live in=1-3," "participated in youth group activities during last 12 months"** and **"friendships important."** Items in bold were retained in the model ( $R^2 > 1\%$ ,  $p < 0.05$ ).

Reference category: Female – sexually active <1year

The two other Rasch-derived person locations were then included in the adjusted multivariable model (Table 4.13). Participation in a youth group, importance of friendships and having lived in three or less homes each contributed to <2% of model variation. Response to the contraception scale contributed <1% and so it was removed from the model. Response to the parenthood scale accounted for 34.7% of model variation ( $\beta = 0.610$ ,  $p < 0.001$ ). A positive attitude towards delaying parenthood until post-adolescence was associated with greater support for abortion.

**Table 4.13**

**AAA Scale Adjusted Multivariable Linear Regression Model for Sexually Active Females (Comparisons by Duration of Sexual Activity, plus Addition of Other Rasch-derived Locations)**

n=355	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.052</b>		<b>&lt;0.001</b>
Age	0.116		0.039				
ATSI	-0.474		0.218				
+Female – sexually active ≥1year	0.030		0.216				
Participated in youth group activities during last 12 months	-0.267	-0.576, 0.041	0.157	0.090	0.063	0.011	0.046
Friendships important	0.120	-0.195, 0.434	0.160	0.456	0.079	0.016	0.014
Number of homes lived in = 1-3	0.143	-0.114, 0.401	0.131	0.275	0.093	0.014	0.023
Adolescent Attitudes towards Adolescent Parenthood score	0.610	0.528, 0.693	0.042	<0.001	0.440	0.357	<0.001

Note: Variables considered in the model were **"number of homes live in=1-3," "participated in youth group activities during last 12 months," "friendships important," "Adolescent Attitudes towards Adolescent Parenthood score"** and **"Adolescent Attitudes towards Contraception score."** Items in bold were retained in the model ( $R^2 > 1\%$ ,  $p < 0.05$ ).

Reference category: Female – sexually active <1year

### 4.3.3 Summary of adolescent attitudes towards abortion

Amongst the adolescents investigated in this study, positive attitudes towards abortion were most common amongst sexually active participants (versus sexually inactive participants), older females (versus younger females) and sexually active females who had previously terminated a pregnancy (versus sexually active females who had never been pregnant or had continued with a pregnancy).

Amongst sexually active adolescents, those who commenced sexual activity at an earlier age, those who reported non-use of the oral contraceptive pill (never or at last sexual encounter) and those who reported never having used condoms were statistically more likely to hold negative attitudes towards abortion. Sexually active participants with at least three sexual partners in the previous year were more supportive of abortion. Sexual activity whilst under the influence of drugs or alcohol and a history of unwanted sexual activity was not associated with abortion attitude.

Demographic factors, psychosocial factors and previous sexual behaviours (including RSB) were all examined in an attempt to quantify the strength of their association with abortion attitudes; with these having minimal or no impact on attitudes when examined simultaneously. However, positive attitudes towards delaying parenthood until post-adolescence, as determined by the AAAP Scale, were strongly associated with greater support for abortion.

## CHAPTER 5

### *Development and Application of the “Adolescent Attitudes towards Adolescent Parenthood Scale”: Methods and Results*

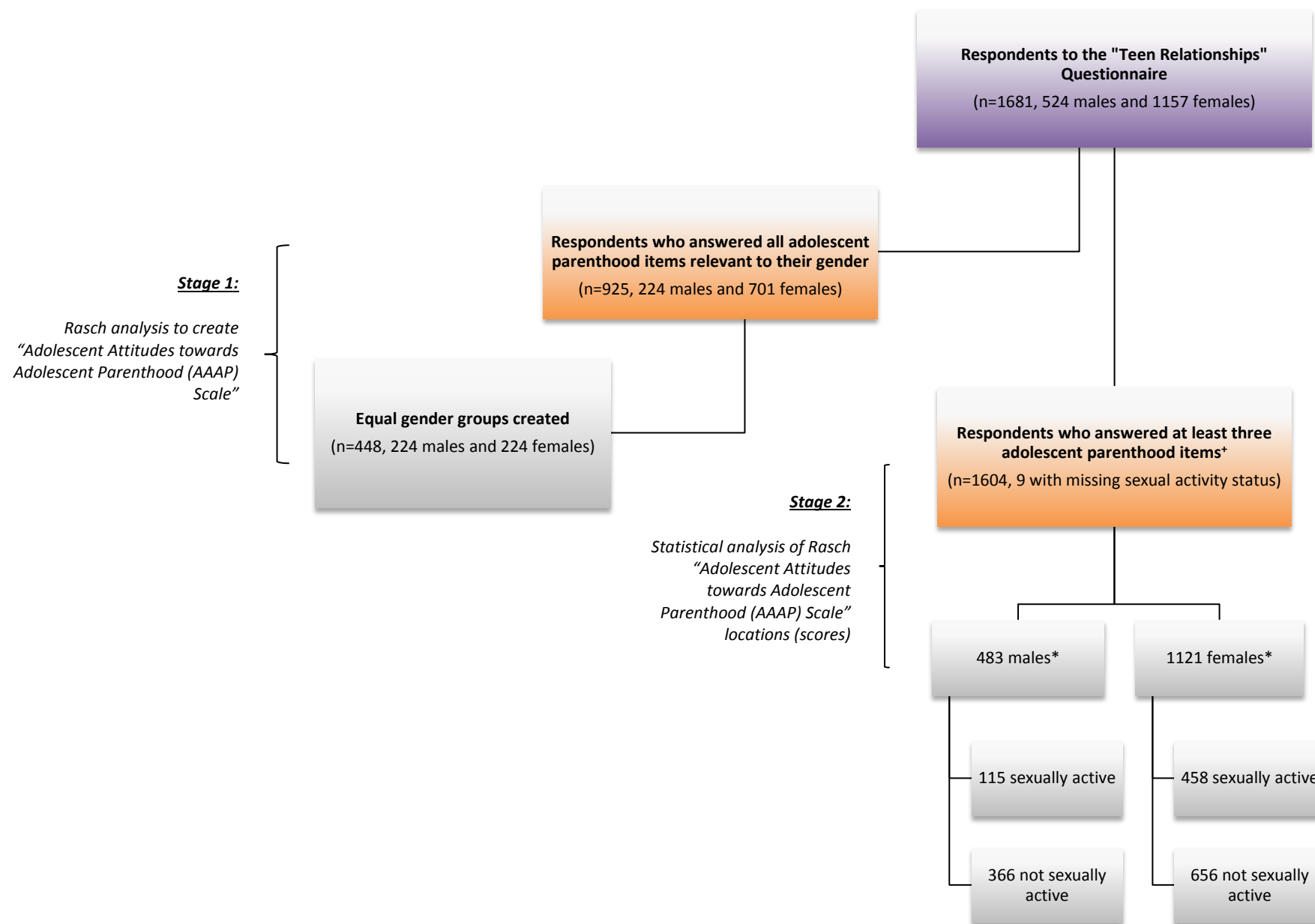
## 5.0 Overview

This chapter details how the Rasch Unidimensional Measurement Model was used to select items to form a scale measuring adolescent attitudes towards early parenting, and to examine the psychometric properties of that scale. Linear Rasch scores of early parenting attitudes were created, with scores (person locations) subjected to traditional statistical analyses. These analyses sought to determine if attitudes towards adolescent parenting were associated with a series of possible explanatory variables. The methods and results relevant to these processes are detailed.

### 5.1 Statistical analysis pathway

Data relating to adolescent parenthood were examined in two stages. Figure 5.1 illustrates the different sample sizes utilised in each stage, relating to the development and analysis of the adolescent parenthood scale. In stage one, the Rasch Unidimensional Measurement Model was applied to a subset of data collected as part of the “Teen Relationships Study” to create the “Adolescent Attitudes towards Adolescent Parenthood (AAAP) Scale,” with effort made to establish good construct validity and reliability. Scores (termed person locations or locations) measuring attitudes towards adolescent parenthood were derived for all participants. In stage two, traditional statistical analyses were applied to the Rasch-derived AAAP Scale locations to determine the association between scale scores and a series of individual, familial or extrafamilial factors; or previous engagement in various RSBs.





\*item location values from Stage 1 were anchored to create person location values for all participants in Stage 2

\*sexual activity status missing for two males and seven females

**Figure 5.1.** Sample sizes used for all data relating to adolescent parenthood.

## 5.2 Stage 1: Rasch analysis to create the “Adolescent Attitudes towards Adolescent Parenthood (AAAP) Scale”

### 5.2.1 Method

#### Scale structure

There were originally 19 attitude and intention items relating to adolescent parenthood, as listed in Table 5.1. Items were answered on a four-point Likert scale ranging from *strongly disagree* to *strongly agree*; and scored from 0 to 3 respectively. Items marked with an asterix (\*) were reverse-scored. A lower score (person location) represented greater support for adolescent pregnancy. A higher score represented greater support for delaying pregnancy until after adolescence. Items preceded by an L were asked of males and females, those preceded by a G were given to girls only and items preceded by a B given to boys only.

**Table 5.1**  
**Original Conceptualisation of the “Adolescent Attitudes towards Adolescent Parenthood (AAAP) Scale” (n=19)**

Item	
L9*	You would be closer to your child if you had them young (under 20)
L14	I want a career before I have a baby
L18	I wouldn't fit in with my group of friends if I had a baby now
L23*	Having a baby will help me grow up
L28	There are certain things (i.e. partner, house, money) you need before you should have kids
L35*	When you're young you have more energy to look after a child
L36	I'd lose my friends if I had a baby right now
L42*	Having a baby would be good for my relationship
L45	There are lots of things I want to do before I have kids
B1	Getting a girl pregnant would be my worst nightmare
G1	Getting pregnant would be my worst nightmare
B3*	Becoming a dad now would change my life in a good way
G3*	Having a baby now would change my life in a good way
B6*	I wouldn't really mind if I got a girl pregnant now
G6*	I wouldn't really mind if I fell pregnant now
B10*	I would rather become a dad before I turn 20
G10*	I would rather become a mum before I turn 20
B17*	It would be easier to cope becoming a dad before I turn 20
G17*	It would be easier to cope becoming a mum before I turn 20

\*indicates item is reverse-scored

Items preceded by an L were asked of both males and females, B items were only given to boys only and G items to girls only

### Rasch analyses

All 19 items were entered into the RUMM2030 program (Andrich et al., 2008) for analysis.

A series of item fit statistics was used to determine fit to the Rasch Unidimensional Measurement Model. Assessment of the psychometric properties of the scale included (a) thresholds, (b) individual and overall item fit, (c) Differential Item Functioning, (d) individual and overall person fit, (e) overall fit to the Rasch Model, (f) item threshold/person distribution, and (g) order and location of items. Reliability of the scale was verified using the Person Separation Index (PSI). Chapter Three described how each fit statistic was applied.

## **5.2.2 Results**

As detailed in Table 5.1, in order to evaluate the performance of the items, the original sample size of 1681 participants was amended so only participants who answered all items relating to adolescent parenthood were considered (n=925). Like the abortion scale, a random sub-sample was then taken to ensure gender groups of equal size. A final selection of 448 participants (n=224 males, 224 females) was used in the Rasch analysis of this scale.

### Thresholds

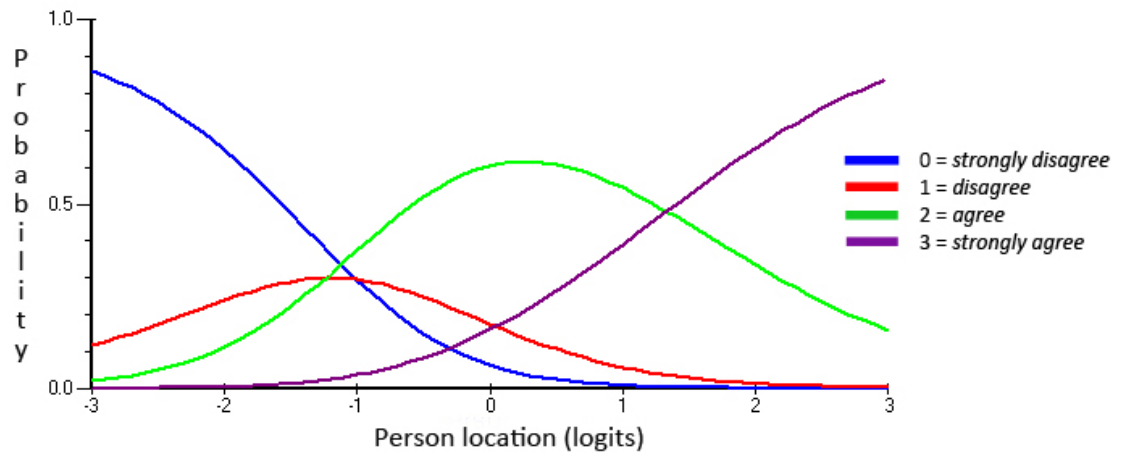
Table 5.2 illustrates the threshold values for all 19 items. Initial assessment indicated four items (L28, G1, B6 and G10) with disordered thresholds. Correctly ordered thresholds indicated that participants with greater support for the delay of parenting were more likely to select higher categories of response (e.g. *strongly agree*) than persons with lower levels of support. Disorder indicates that this would not always be the case. The highlighting in Table 5.2 represents where threshold points were reversed.

**Table 5.2**  
**Threshold Values for all Initial Items in the AAP Scale (n=19)**

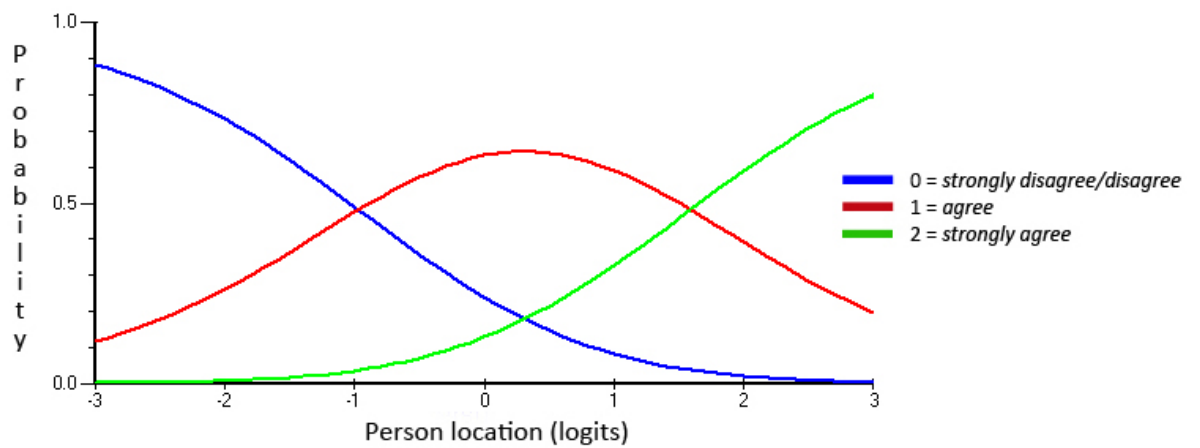
Item	Thresholds			
	1st <i>strongly disagree/ disagree</i>	2nd <i>disagree/ agree</i>	3rd <i>strongly agree/ agree</i>	
L9	-1.83	-0.16	1.99	
L14	-1.44	-0.36	1.81	
L18	-0.84	-0.18	1.02	
L23	-1.75	0.07	1.68	
L28	-0.70	-0.94	1.64	*
L35	-1.69	-0.43	2.12	
L36	-1.44	0.06	1.38	
L42	-1.93	-0.24	2.17	
L45	-0.84	-0.73	1.57	
B1	-0.87	0.00	0.87	
G1	-1.39	0.86	0.53	*
B3	-0.78	-0.42	1.20	
G3	-0.61	-0.49	1.10	
B6	-0.49	-0.61	1.09	*
G6	-0.48	-0.33	0.82	
B10	-1.02	-0.84	1.87	
G10	-0.79	-0.88	1.67	*
B17	-1.39	-0.43	1.83	
G17	-1.13	-0.58	1.72	

\* indicates reversed thresholds

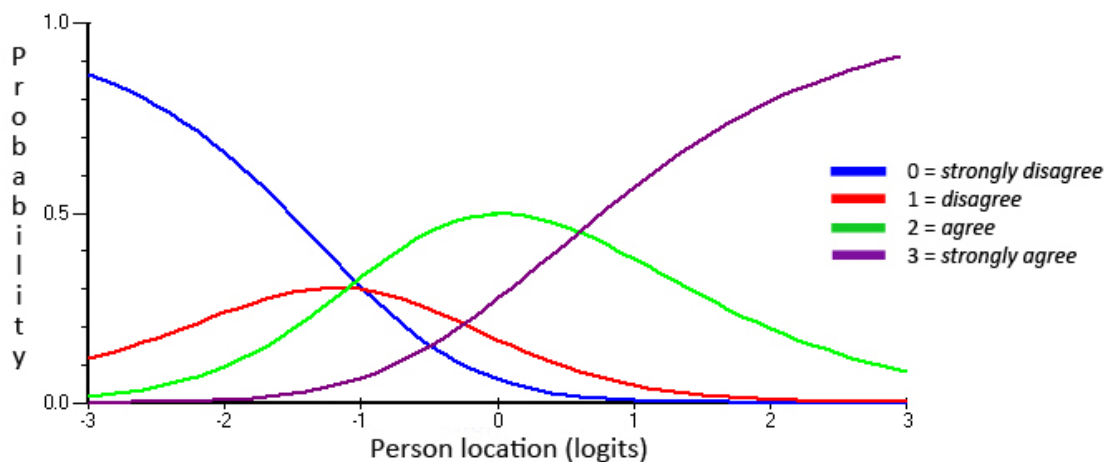
In order to deal with the reversed thresholds, items L28, B6 and G10 required rescoring as follows: 0/1=0, 2=1, and 3=2. In descriptive terms this meant combining *strongly disagree* and *disagree*, leaving *agree* and *strongly agree* separate. Item G1 was rescored by collapsing the *agree* and *strongly agree* categories together (i.e. 0=0, 1=1, 2/3=2). Figures 5.2-5.5 illustrate the CCCs for each of the items before and after the reduction of categories. The remainder of the analyses were carried out using the collapsed category data.



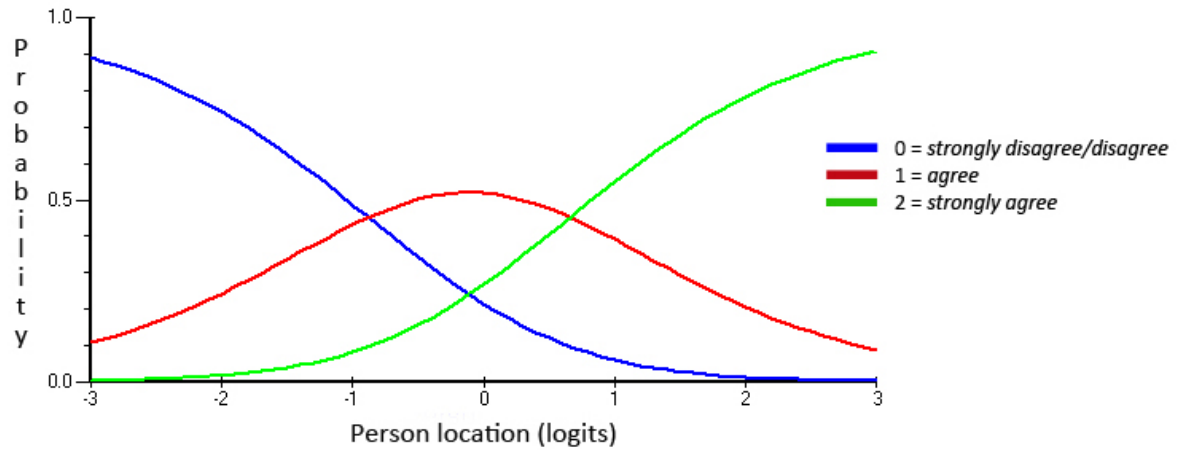
**Figure 5.2a.** Category characteristic curve for item L28 ("there are certain things you need before you should have kids") with disordered thresholds.



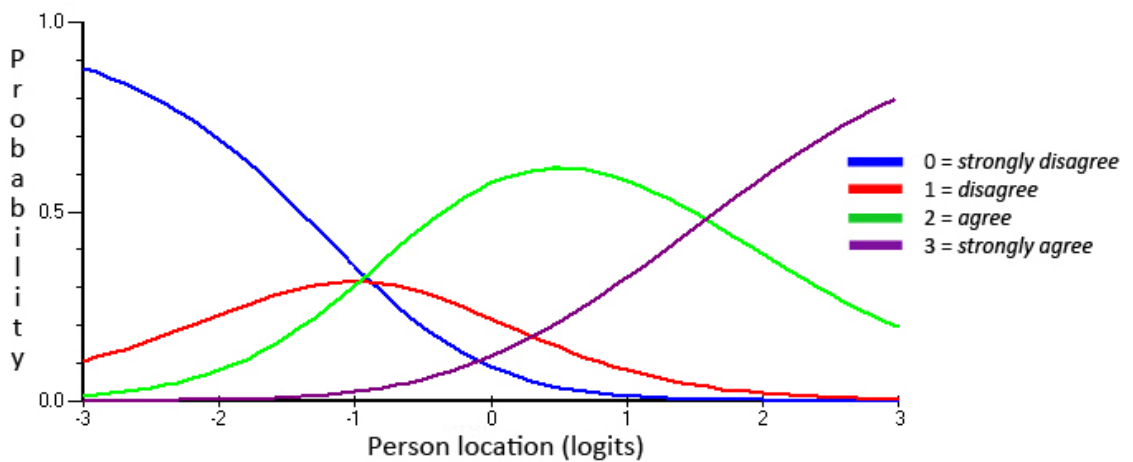
**Figure 5.2b.** Category characteristic curve for item L28 ("there are certain things you need before you should have kids") with ordered thresholds.



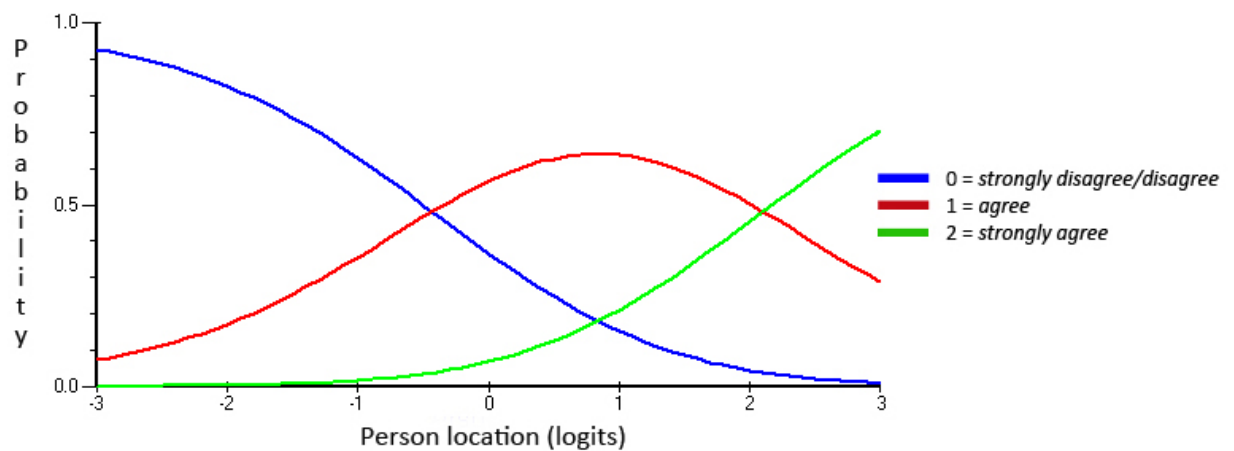
**Figure 5.3a.** Category characteristic curve for item B6 ("I wouldn't really mind if I got a girl pregnant now") with disordered thresholds.



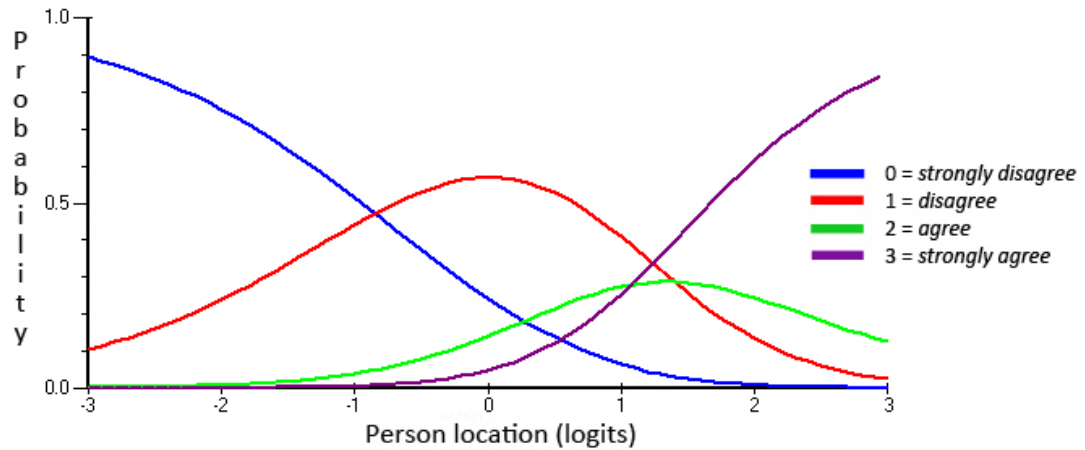
**Figure 5.3b.** Category characteristic curve for item B6 ("I wouldn't really mind if I got a girl pregnant now") with ordered thresholds.



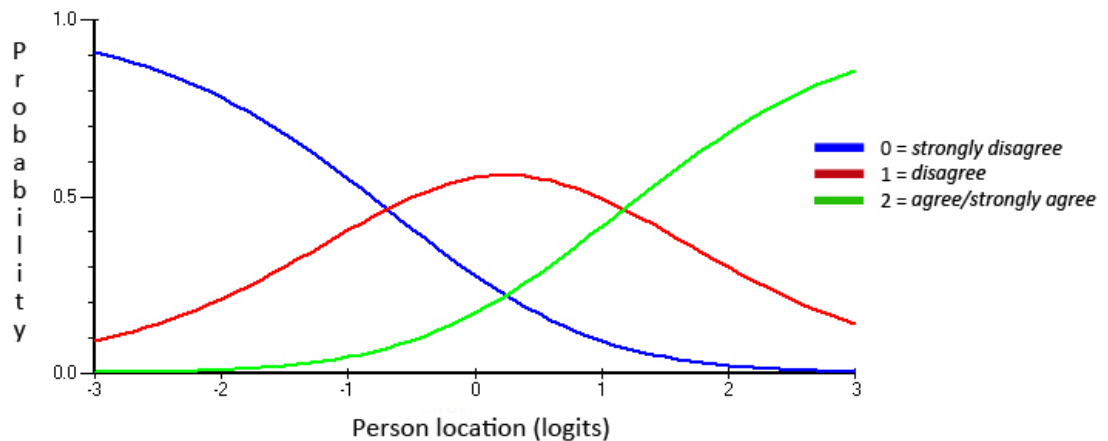
**Figure 5.4a.** Category characteristic curve for item G10 ("I would rather become a mum before I turn 20") with disordered thresholds.



**Figure 5.4b.** Category characteristic curve for item G10 ("I would rather become a mum before I turn 20") with ordered thresholds.



**Figure 5.5a.** Category characteristic curve for item G1 ("getting pregnant would be my worst nightmare") with disordered thresholds.



**Figure 5.5b.** Category characteristic curve for item G1 ("getting pregnant would be my worst nightmare") with ordered thresholds.

### Item fit

Table 5.3 illustrates item fit statistics for all 19 items, sorted by increasing  $\chi^2$  value. Many items exhibited low residuals ( $< \pm 2.5$ ) and high  $\chi^2$  probabilities ( $p > 0.05$ ), with Bonferroni adjustments made to the significance probability values. These results were indicative of good data to model fit. The highlighting in Table 5.3 indicates where an item did not meet a fit statistic criterion. Item L36 for example had a high fit statistic of 5.34 and p value  $< 0.05$ .

**Table 5.3**  
***Item Fit Statistics for all Initial Items in the AAP Scale (n=19)***

Item	Location	Residual	$\chi^2$	p
B3	0.24	-0.11	1.26	0.74
L23	0.04	0.18	2.68	0.44
L28	0.11	1.05	2.68	0.44
L14	-0.60	-1.48	3.76	0.29
G3	0.14	-0.59	4.09	0.25
L35	0.22	1.85	4.93	0.18
G6	-0.18	-1.54	5.46	0.14
B10	-0.33	-0.73	5.66	0.13
L45	-0.61	-1.23	6.45	0.09
B17	-0.51	-1.75	6.87	0.08
G1	-0.08	-1.22	6.87	0.08
B6	-0.16	-1.06	9.02	0.03
B1	0.42	3.61	10.13	0.02
L9	0.62	3.09	12.68	0.01
G10	0.43	-3.05	18.31	0.00
G17	-0.60	-2.93	19.41	0.00
L18	0.77	5.41	31.58	0.00
L42	-1.06	-3.71	36.35	0.00
L36	1.14	5.34	49.07	0.00

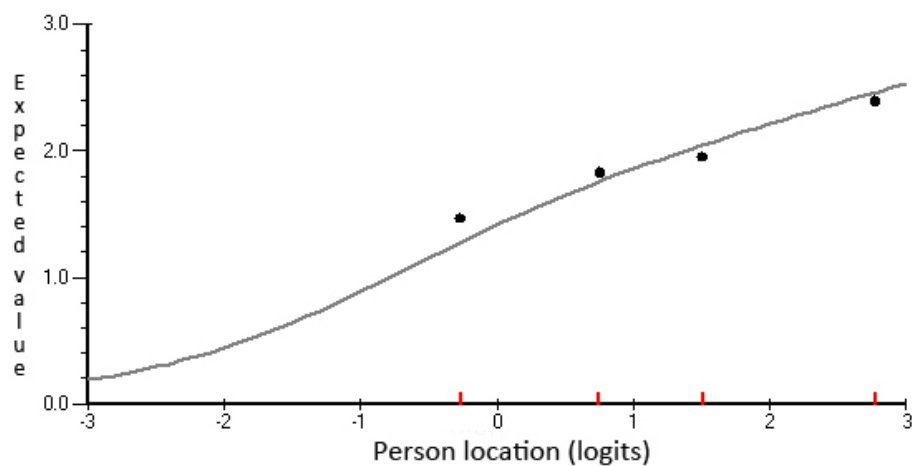
Ill-fitting items were deleted one at a time in the following order: L36, L18, L42, B1, L9. Even though items G10 and G17 indicated item misfit in Table 5.3, once the other five ill-fitting items were deleted all remaining items fitted the model well. However, the fit residuals for items L28 and L35 remained marginally high ( $>\pm 2.5$ ), indicating a lower level of discrimination for these items relative to the items as a whole. The item fit statistics for the remaining 14 items in the scale are provided in Table 5.4.



**Table 5.4**  
**Item Fit Statistics for Interim Items in the AAAP Scale (n=14)**

Item	Location	Residual	$\chi^2$	p
G3	0.39	1.09	0.96	0.81
G1	0.19	-0.45	1.09	0.78
L23	0.17	0.38	1.57	0.67
L14	-0.5	-0.16	1.84	0.61
B3	0.28	1.24	1.88	0.60
B6	-0.15	-0.18	2.84	0.42
L45	-0.55	-0.25	3.88	0.27
G17	-0.44	-1.97	4.32	0.23
B17	-0.54	-2.07	6.03	0.22
B10	-0.31	-0.72	6.51	0.14
L28	0.27	2.85	8.08	0.11
G6	0.01	-0.65	8.08	0.09
G10	0.77	-1.74	11.28	0.09
L35	0.41	2.97	13.29	0.07

At this point, item L35 was considered the worst performing item as it had the highest  $\chi^2$  value and a fit residual that exceeded the desired range. However, inspection of the ICC for this item (Figure 5.6) indicated that the mean scores of people in each class interval (represented by a dot) were close to the theoretical curve (indicated by the solid line). Therefore the item was retained.



**Figure 5.6.** Item characteristic curve for the worst performing item L35 ("when you're young you have more energy to look after a child").

Overall item fit to the Rasch Model was examined by assessing the mean item fit residual. A normally distributed mean item fit residual of -0.03 (SD=1.56) indicated overall item fit was good. The large standard deviation is most likely a result of the high residuals evident in items L28 and L35 (refer Table 5.4).

#### Local independence

Item residual correlations were examined and showed no positive values. Two pairs of items were negatively correlated: items L14 and B3 (-0.30) and items G3 and G17 (-0.30). These findings did not warrant the examination of sub-scales or the deletion of items.

#### Differential Item Functioning

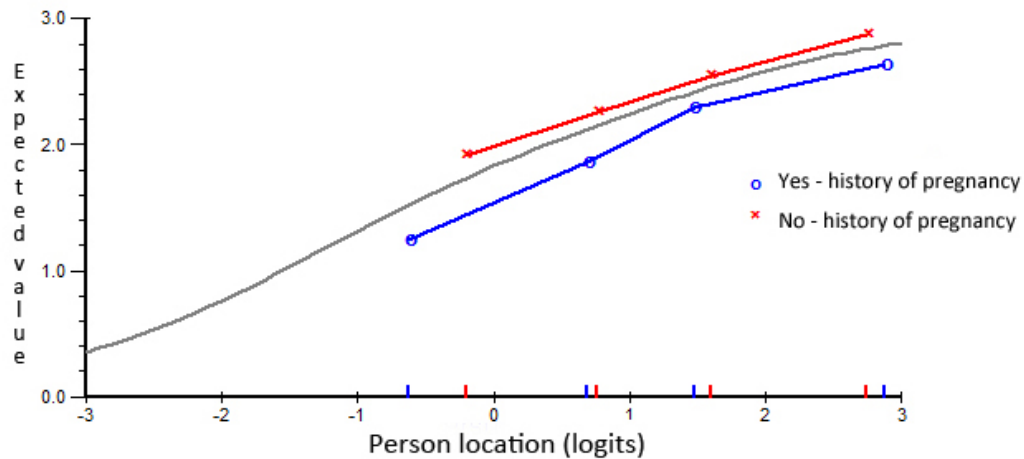
The following sub-groups were examined for DIF: males and females, sexually active and inactive participants; and participants who had previously been pregnant versus those who had not.

As illustrated in Table 5.5, L14 was the only item to demonstrate DIF. For persons with the same total score, those who had never been pregnant were more likely to endorse L14 (*"I want a career before I have a baby"*) than those with a history of pregnancy (resulting in either live birth or abortion). Figure 5.7 illustrates the ICC for item L14, illustrating that the observed means of each sub-group were systematically different; with the observed means for the group who had never been pregnant being consistently greater. Figure 5.7 also illustrates that the DIF was uniform.

**Table 5.5****Differential Item Functioning by Gender, Sexual Activity and Pregnancy History for the Final 14 Items of the AAAP Scale**

Item	F-test		
	gender	sexual activity	pregnancy history
L14	0.29	0.08	11.54*
L23	5.71	0.27	3.72
L28	1.16	2.67	0.08
L35	2.45	0.01	1.34
L45	0.65	3.20	0.21
G1	0.00	0.36	3.87
B3	0.00	1.68	0.87
G3	0.00	0.35	0.01
B6	0.00	0.97	1.04
G6	0.00	2.47	1.19
B10	0.00	2.31	3.63
G10	0.00	9.99	1.18
B17	0.00	0.15	2.21
G17	0.00	1.22	1.80

\*Significant misfit after Bonferroni adjustment

**Figure 5.7.** Item characteristic curve for item L14 ("I want a career before I have a baby") illustrating the overall response curve along with the response curves for respondents with and without a history of pregnancy.

Attempts were made to correct this uniform DIF by splitting the item into two items on the basis of pregnancy history. This meant participants who had never been pregnant formed an item separately from those who had been pregnant, regarding their response to the item "I want a career before I have a baby." The scale was also assessed with this item deleted. Neither strategy improved overall model fit, so the item was retained in its original form.

### Person fit

In terms of individual person fit, 48 of the 448 participants had a person fit residual that was outside the range -2.5 to 2.5. Of these, 41 had negative residuals, indicating a purer Guttman pattern than expected by the Rasch Model (i.e. participants had tended to respond in a fixed or similar way to the items). These participants were retained. Seven participants had a residual greater than 2.5 due to a more disordered response pattern than was expected under the Rasch Model. These persons were removed from the analysis, but, as this did not change the overall fit of data to the Rasch Model, they were reinstated.

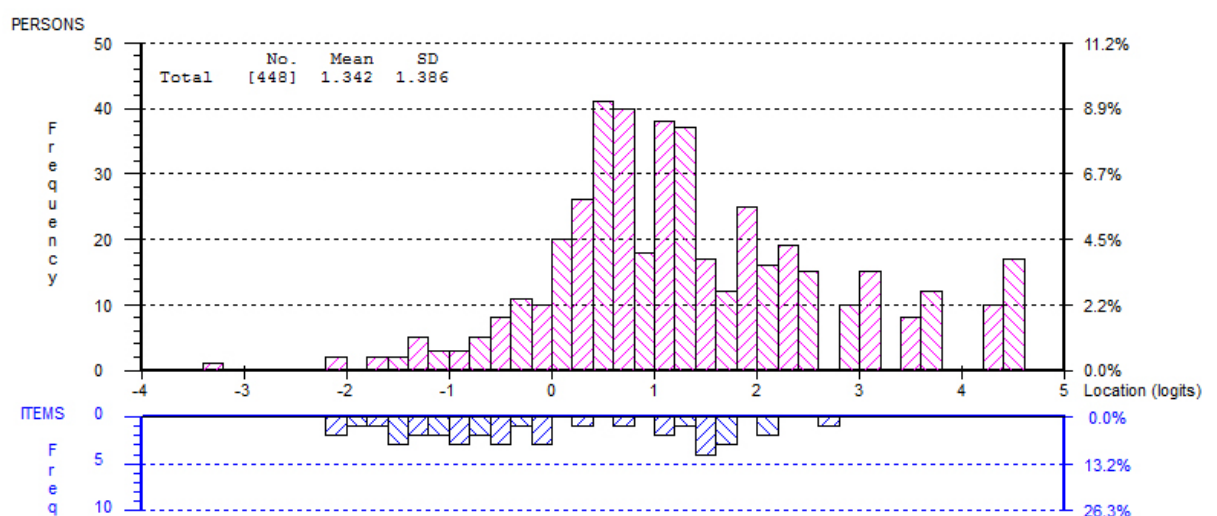
Overall person fit to the Rasch Model closely approximated a normal distribution as required. The mean person fit residual was -0.48 (SD=1.50).

### Overall fit to the Rasch Model

The non-significant item-trait interaction test of fit ( $\chi^2=51.05$ ,  $df=42$ ,  $p=0.16$ ) indicated overall fit of the data to the Rasch Model was good. The sample size was modified exclusively for this chi square calculation, as per the recommendations of Andrich and Styles (2009).

### Item threshold/person distribution

Inspection of the person-item threshold distribution map (Figure 5.8) indicated that items were reasonably well distributed relative to the persons. However, some individuals (those located beyond the most intense or "difficult" items) could not be adequately measured by this set of items as the items were too easy relative to the locations of these individuals.



**Figure 5.8.** Person-item threshold distribution map for the AAP scale illustrating person (red) and item (blue) thresholds in logits.

Table 5.6 summarises the comparative mean person locations for different sub-groups within the sample. The greatest support for adolescent parenthood occurred amongst older participants, males, those from ATSI backgrounds, individuals with no religious affiliations, those who were sexually active, participants with a history of pregnancy and those who had continued with a pregnancy (in comparison to those who had chosen an abortion). A more formal comparison of mean scores, along with the statistical significance, is provided later in this chapter.

**Table 5.6**  
***Score Trends for Different Sub-groups Responding to the AAAP Scale***

Support for adolescent parenthood	
Age	increases with age
Gender	males > females
ATSI status	ATSI > non-ATSI
Religious affiliation	no religion > religious
Sexual activity	sexually active > not yet sexually active
Pregnancy history	history of pregnancy > never been pregnant
Pregnancy outcome	history of live births only > history of terminations only > never been pregnant

#### Order and location of items

Table 5.7 lists the final set of 14 items by increasing location together with the revised response categories. The table shows that item L45 is the “easiest” (or least intense item) for participants to agree with and that item G10 (answered by females only) was the “hardest” (or most intense item). Participants would only require a relatively low level of support for delaying parenthood in order to agree with item L45, whereas females would require a relatively high level of support for delaying parenthood in order to agree with item G10. The order of items makes intuitive sense, and for all items where a male and female item exists, these matching items are closely located, with the exception of items B10 and G10.

Mean items locations had a narrow spread of only -0.55 – 0.77 logits. However, the threshold locations that were illustrated in Figure 5.8 show a wider distribution.

**Table 5.7*****Final List of Items for the AAP Scale (Location Order) (n=14)***

	Item	Response categories	Location
L45	There are lots of things I want to do before I have kids	SD, D, A, SA	-0.55
B17*	It would be easier to cope becoming a dad before I turn 20	SD, D, A, SA	-0.54
L14	I want a career before I have a baby	SD, D, A, SA	-0.50
G17*	It would be easier to cope becoming a mum before I turn 20	SD, D, A, SA	-0.44
B10*	I would rather become a dad before I turn 20	SD, D, A, SA	-0.31
B6*	I wouldn't really mind if I got a girl pregnant now	SD/D, A, SA	-0.15
G6*	I wouldn't really mind if I fell pregnant now	SD, D, A, SA	0.01
L23*	Having a baby will help me grow up	SD, D, A, SA	0.17
G1	Getting pregnant would be my worst nightmare	SD, D, A/SA	0.19
L28	There are certain things (i.e. partner, house, money) you need before you should have kids	SD/D, A, SA	0.27
B3*	Becoming a dad now would change my life in a good way	SD, D, A, SA	0.28
G3*	Having a baby now would change my life in a good way	SD, D, A, SA	0.39
L35*	When you're young you have more energy to look after a child	SD, D, A, SA	0.41
G10*	I would rather become a mum before I turn 20	SD/D, A, SA	0.77

\*indicates item is reverse-scored

Items preceded by an L were asked of both males and females, G items were only given to girls and B items to boys  
SD=strongly disagree, D=disagree, A=agree, SA=strongly agree

### Construct validity and reliability

A reasonable degree of construct validity was established according to Messick's (1989) principles of construct under-representation and construct-irrelevant variance. All misfitting items were removed so the final set of items showed good internal consistency; the item difficulty hierarchy and mean person locations for different sub-groups made sense intuitively; and the person-item threshold distribution map (Figure 5.8) indicated that item locations and person locations were closely aligned.

Reliability of the AAP Scale was verified through a strong PSI of 0.80.

### 5.2.3 Summary of AAP scale development

The Rasch Unidimensional Measurement Model was applied to data collected from the "Teen Relationships Study," to create the 14 item "Adolescent Attitudes towards Adolescent Parenthood (AAP) Scale" measuring adolescent attitudes towards abortion. The scale's measurement properties were examined through use of the software program RUMM2030 (Andrich et al., 2008).

Response categories for items L28, G1, B6 and G10 were collapsed due to disordered thresholds. For congruence, the categories of items G6, B10 and B1 could have been

collapsed to match their gender counterparts. This would make future use of the scale easier to format and score, as male and female versions of those scales would be the same. However, for this research project, only those items demonstrating disorder had their categories collapsed.

A reasonable degree of internal consistency (part of the evidence for construct validity) and reliability was established for this scale. Assessment of persons and items on the same continuum indicated that future versions of the scale could include items that target individuals who strongly support delaying parenthood until post-adolescence. Similarly, as many items were located close to each other, some could be removed without affecting the overall performance of the scale. Further Rasch analyses would be required to ensure the overall performance of an amended scale was not compromised.

The fit statistics indicated that the final set of items selected to form the scale provided an effective tool for the measurement of attitudes towards adolescent parenting. The scale was shown to be unidimensional and interval-level person locations of attitude were obtained.

## 5.3 Stage 2: Statistical analysis of Rasch AAAP scale scores (locations)

### 5.3.1 Method

The Rasch-derived locations ( $n=448$ ) for each of the 14 items were anchored<sup>8</sup> to produce a location for every person in the original sample of 1681 participants. Therefore, even if a participant had not answered all the items on adolescent parenthood that were relevant to their gender, an attitude location could be derived. Participants answering fewer than three items in relation to adolescent parenthood were then omitted from all further analyses due to their assumed limited engagement with the questionnaire.

Locations were entered into PASW v18.0 (IBM SPSS Inc., 2009). A lower location indicated greater support adolescent pregnancy and a higher location indicated greater support for the delay of parenting until post-adolescence. It is incorrect to assume that a location of

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<sup>8</sup> Through a process of item anchoring, Rasch analysis software allows the user to input known values (e.g. anchored item locations) so output (e.g. person locations) can be validly equated (T. G. Bond & Fox, 2001; RUMM Laboratory, 2009; Wolfe, 2000).

zero equates to a neutral stance, and that a positive or negative location definitively indicated either support or opposition to adolescent parenting. A series of comparative means between different groups, as documented in Chapter Three, were conducted; using t-tests or one-way ANOVA as appropriate.

A predicted value of the AAAP Scale location was calculated based on a linear combination of independent explanatory variables. A series of adjusted univariate and multivariable analyses were undertaken to quantify the relative contribution of correlates. The guidelines for these regressions were detailed in Chapter Three. All multivariable models were replicated with the addition of the two other Rasch locations (i.e. locations from the “Adolescent Attitudes towards Abortion Scale” and the “Adolescent Attitudes towards Contraception Scale”).

### 5.3.2 Results

As illustrated in Figure 5.1, anchoring of items for 448 participants produced an adolescent parenthood attitude location for 1604 individuals, of whom 483 were male (115 sexually active, 366 not sexually active) and 1121 were female (458 sexually active, 656 not sexually active). Data on sexual activity status were absent for two males and seven females.

Measures of central tendency for the AAAP Scale locations are provided in Table 5.8. For all participants the mean scale location was 1.39 logits (SD=1.35). Males (1.15) tended to score lower than females (1.50), indicating greater support for adolescent parenting ( $p<0.001$ ).

**Table 5.8**

*Measures of Central Tendency for AAAP Scale Locations (n=1604)*

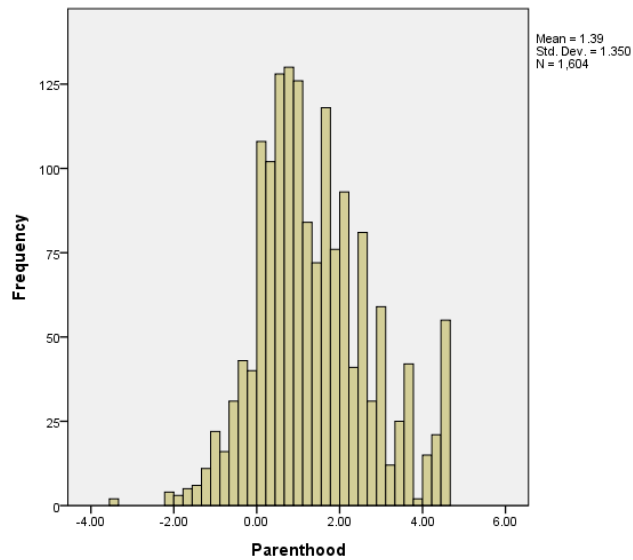
	n	Mean (SD)	Median (IQR)	Min-Max
<b>All participants</b>	1604	1.39 (1.35)	1.21 (0.46, 2.20)	-3.49, 4.51
<b>Males</b>	483	1.15 (1.19)	0.83 (0.29, 1.81)	-3.34, 4.36
<b>Females</b>	1121	1.50 (1.40)	1.34 (-0.60, 2.42)	-3.49, 4.51

Locations appeared to be close to a normal distribution and so no transformation was performed. Figures 5.9 – 5.11 illustrate the histograms and the quantile-quantile (Q-Q) plot that confirm this distribution.

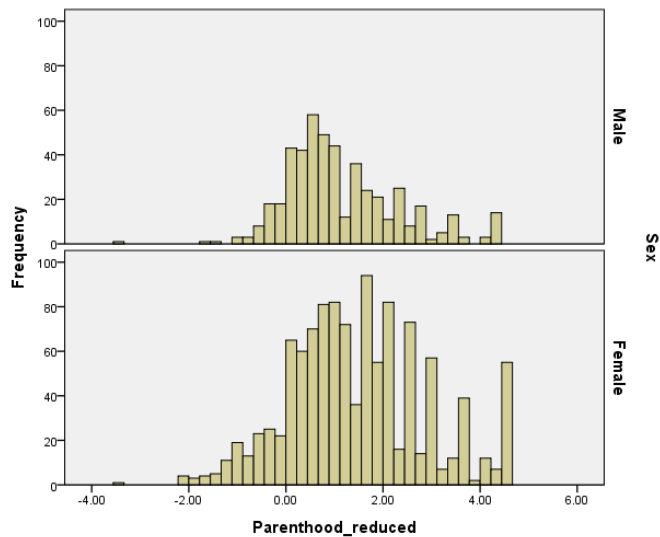


## CHAPTER FIVE

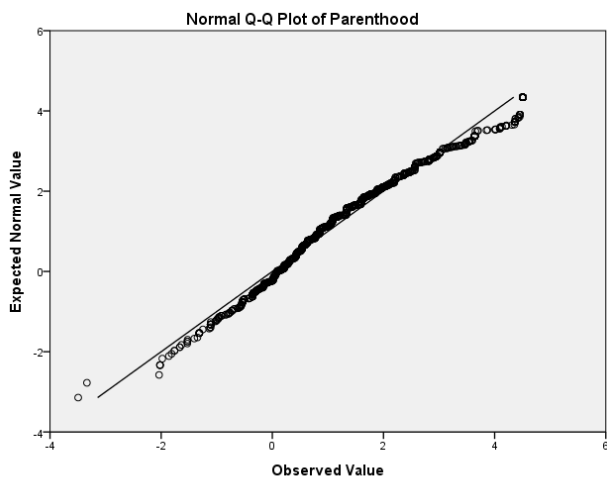
### Development and Application of the "Adolescent Attitudes towards Adolescent Parenthood Scale": Methods and Results



**Figure 5.9.** Distribution of AAP scale locations for all participants (n=1604).



**Figure 5.10.** Distribution of AAP scale locations for all males (n=483) and females (n=1121).



**Figure 5.11.** Q-Q Plot of AAP scale locations.

### 5.3.2.1 Comparative means of AAAP scale locations

#### Attitudes towards Adolescent parenthood by age (males and females separately)

The mean locations for the AAAP Scale across different age groupings are provided in Table 5.9. For males, the difference in mean location by age was not significant ( $p=0.779$ ). Amongst females, support for adolescent parenting was highest amongst older participants ( $p<0.001$ ).

**Table 5.9**

*Rasch Mean AAAP Scale Locations (Comparisons by Age within Gender) (n=1604)*

	Mean (SD)	p
MALES		
≤13 years	1.16 (1.05)	0.779
14-15 years	1.09 (1.24)	
≥16 years	1.31 (1.15)	
FEMALES		
≤13 years	1.63 (1.20)	<0.001
14-15 years	1.63 (1.30)	
≥16 years	1.19 (1.59)	

#### Attitudes towards Adolescent parenting by sexual activity status (males and females separately)

Data on sexual activity status was absent for two males and seven females, meaning the sample size for this analysis was reduced to 1595. Results are provided in Appendix D (Table D.1). Significant differences are highlighted in the table.

Overall, sexually active participants were more likely to support adolescent parenting than peers who were not sexually active. This trend remained evident regardless of personal history, family history, alcohol and/or other drug use, family functioning, neighbourhood factors, school factors, psychological profiles, friendships, romantic relationships, sexual behaviour or actual desire to become a parent soon.

For males, whilst the overall trend was for sexually active participants to be more supportive of adolescent parenting than their peers, a statistically significant difference in mean score was detected in only a few cases. Sexually active males were significantly more likely to support adolescent parenting if their mother had only completed limited schooling ( $p=0.043$ ), they lived in an unsafe neighbourhood ( $p=0.044$ ), they did not participate in sporting or recreation activities ( $p=0.009$ ), they scored borderline or abnormal on the Strengths and Difficulties Prosocial Scale (Goodman, 1999) ( $p=0.022$ ), they had no close

friends ( $p=0.037$ ) or if most of their friends were of a different age ( $p<0.001$ ). Even a general comparison between sexually active and inactive males, without the contribution of any additional variables, failed to find a statistically significant different score (i.e. sexually inactive males=1.20, sexually active males=1.00,  $p=0.122$ ).

In contrast, amongst females, a significant difference in mean score was detected between sexually active (1.13) and inactive (1.76) participants ( $p<0.001$ ). This trend was statistically significant for nearly every comparative variable. This meant that, for females, sexual behaviour was associated with greater support for adolescent parenting.

#### Attitudes towards Adolescent parenting by sexual activity duration (sexually active females)

In order to examine the range of locations across different sexual behaviours, sexually active participants were examined separately. The composite variable of sexual activity duration (i.e. sexually active <1yr or sexually active  $\geq 1$ yr) reduced the sample for this analysis. Only 64 sexually active males (out of 115) and 376 sexually active females (out of 458) had provided duration data and engaged in vaginal intercourse.

The limited male data that resulted from application of the composite variable and the lack of significantly different variables amongst males in Table D.1, led to a decision to exclude males from all future comparative analyses.

Therefore, for females only, mean locations for the AAAP Scale were compared by sexual activity duration. The same selection of individual, familial and extrafamilial variables was used as potential explanatory variables, in addition to variables that related to sexual and contraceptive behaviour. The results are provided in Appendix D (Table D.2) and significant differences are highlighted ( $p<0.05$ ).

Amongst sexually active females, those who had been sexually active for at least a year were more supportive of adolescent parenting than those who had only recently commenced sexual activity (sexually active <1yr=1.47, sexually active  $\geq 1$ yr=0.87,  $p=0.001$ ). This trend remained evident regardless of personal history, family history, alcohol and/or other drug use, family functioning, neighbourhood factors, school factors, psychological profiles, friendships, romantic relationships, sexual behaviour or actual desire to become a parent soon.

Attitudes towards Adolescent parenting by risky sexual behaviour (sexually active females)

For all sexually active females, mean adolescent parenthood attitude locations within selected RSB categories were compared (Table 5.10). For each RSB category, the riskiest sexual behaviour is listed first.

**Table 5.10****Rasch Mean AAAP Scale Locations for Sexually Active Females (Comparisons within RSB Categories)**

Note: Riskier behaviour is listed first

Correlate		n	Mean (SD)	p
COMMENCEMENT OF SEXUAL ACTIVITY AT AN EARLY AGE				
Age at sexual debut (vaginal intercourse)	≤15	276	0.85 (1.51)	0.001
	≥16	100	1.46 (1.51)	
Age at sexual debut (oral sex or vaginal intercourse)	≤15	353	1.04 (1.51)	0.030
	≥16	85	1.44 (1.61)	
FAILURE TO CONSISTENTLY USE CONDOMS OR OTHER CONTRACEPTIVES				
Contraception used in past ever	No	47	0.69 (1.53)	0.036
	Yes	411	1.18 (1.51)	
Contraception used last time had sex	No	149	0.63 (1.56)	<0.001
	Yes	309	1.36 (1.44)	
Oral contraceptive pill used in past ever	No	314	1.21 (1.47)	0.087
	Yes	144	0.95 (1.60)	
Oral contraceptive pill used last time had sex	No	408	1.08 (1.50)	0.092
	Yes	50	1.47 (1.64)	
Condoms used in past ever	No	167	1.08 (1.47)	0.600
	Yes	291	1.15 (1.55)	
Condoms used in past year	Never	58	0.83 (1.75)	0.036
	Sometimes	213	0.92 (1.50)	
	Always	90	1.44 (1.45)	
	Sometimes/never	271	0.90 (1.56)	0.004
Condoms used last time had sex	Always	90	1.44 (1.45)	0.039
	No	212	0.90 (1.55)	
	Yes	160	1.23 (1.50)	
A HISTORY OF MULTIPLE SEX PARTNERS				
Number of oral sex partners in past year	≥3	86	1.29 (1.42)	0.553
	1-2	301	1.10 (1.56)	
	0	67	1.06 (1.47)	
Number of vaginal intercourse partners in past year	>1	250	1.25 (1.45)	0.052
	1	208	0.97 (1.59)	
		≥3	93	1.17 (1.37)
2		64	1.02 (1.47)	
1		208	0.97 (1.59)	
Number of sexual partners in past year (oral sex or vaginal intercourse)	≥3	123	1.32 (1.39)	0.072
	1-2	312	1.02 (1.55)	
	0	23	1.54 (1.64)	
SEXUAL ACTIVITY WHILST UNDER THE INFLUENCE OF DRUGS AND/OR ALCOHOL				
Drunk or high last time had sex	Yes	56	1.44 (1.29)	0.035
	No	317	0.97 (1.56)	
UNWANTED SEXUAL ENCOUNTER				
Ever had unwanted sex	Yes	148	1.12 (1.50)	0.438
	No	232	0.99 (1.54)	

Females who commenced sexual activity at 15 years of age, or earlier, were more supportive of adolescent parenthood than females who delayed sexual activity until they were at least 16 years old. This finding was significant and it did not matter if the sexual activity was vaginal intercourse ( $p<0.001$ ) or any form of sexual activity ( $p=0.030$ ).

Sexually active females who had never used contraception ( $p=0.036$ ) or did not report using contraception at their last sexual encounter ( $p<0.001$ ) were more supportive of adolescent parenting. However, use of the oral contraceptive pill, either in the past ( $p=0.087$ ) or at last sexual encounter ( $p=0.092$ ), provided no significant difference in attitudes towards adolescent parenting.

Sexually active females who were more supportive of adolescent parenting were more likely to not use condoms in the past year ( $p=0.004$ ) or at last sexual encounter ( $p=0.039$ ).

Females who reported *not* being drunk or high at their last sexual encounter were significantly more likely ( $p=0.035$ ) to support adolescent parenting.

The number of sexual partners in the past year (oral or vaginal;  $p=0.072$ ) and/or an unwanted sexual encounter ( $p=0.438$ ) had no statistically significant effect on attitudes towards adolescent parenting.

#### Attitudes towards Adolescent pregnancy by pregnancy outcome (sexually active females)

Table 5.11 illustrates that, across three different categories of pregnancy history, support for adolescent parenting was highest amongst females who had already been pregnant and decided to continue with their pregnancy (1.14) followed by females who had decided to terminate a pregnancy (1.48). Sexually active females who had never been pregnant were least supportive of adolescent parenting (1.53,  $p<0.001$ ).

**Table 5.11.**

***Rasch Mean AAAP Scale Locations for Females (Comparisons by Pregnancy History) (n=458)***

	%	Mean (SD)	p
<b>PREGNANCY STATUS</b>			
Sexually active never pregnant	40	1.53 (1.31)	
Sexually active pregnant terminated	42	1.48 (1.39)	
Sexually active pregnant continued	17	1.14 (1.52)	<0.001

### 5.3.2.2 Linear regressions

#### Individual, familial and extrafamilial factors only (all participants)

##### *Linear regression models adjusting for gender, age, ATSI status, sexual activity and sexual activity duration*

A selection of significant variables from Table D.1 was tested univariately in a linear regression model. Adjusted univariate linear regressions were run for all participants (Table D.3) and for females only (Table D.4).

Results for both tables were very similar, highlighting the fact that most significant differences were due to the female sample. As already reported (Table D.1), there were few significantly different variables amongst males and removing them from the linear regressions also provided a slightly more favourable base model ( $R^2$ : 0.081 compared to 0.075). Therefore, males were excluded from all further regressions.

The following variables were entered into a multivariable model due to their performance in the adjusted univariate linear regressions from Table D.4 (i.e.  $p < 0.05$ ,  $R^2$  change  $> 1\%$ ): "*religious affiliation=Christianity,*" "*father's highest education level=finish school/TAFE,*" "*father's highest education level=university,*" "*low personal self-efficacy,*" "*relationship status= $\geq 1$ year,*" "*recruitment site (reference=secondary school – not sexually active)*" and "*previous history of a termination.*" When these variables were considered in an adjusted multivariable model (Table 5.12) being in a relationship for at least a year ( $\beta = -0.131$ ,  $R^2$  change = 0.021,  $p = 0.005$ ), low self-efficacy ( $\beta = -0.337$ ,  $R^2$  change = 0.015,  $p = 0.015$ ) and having been recruited into the study from an antenatal clinic ( $\beta = -2.067$ ,  $R^2$  change = 0.196,  $p < 0.001$ ) were significantly associated with greater support for adolescent parenting.

**Table 5.12****AAAP Scale Adjusted Multivariable Linear Regression Model (Comparisons by Sexually Active Duration of Females only)**

<i>n</i> =935	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.058</b>		<b>&lt;0.001</b>
Age	0.100		0.054				
ATSI	-0.219		0.237				
+Female – sexually active <1year	-0.131		0.169				
+Female – sexually active ≥1year	0.364		0.201				
+Female – sexually active (duration data missing)	0.370		0.211				
Relationship status=≥1year	-0.131	-0.36, 0.201	0.169	0.438	0.079	0.021	0.005
Low personal self-efficacy	-0.337	-0.605, -0.070	0.136	0.014	0.094	0.015	0.015
Recruitment site=antenatal clinic	-2.067	-2.484, -1.679	0.208	<0.001	0.290	0.196	<0.001

Note: Variables considered in the model were "religious affiliation=Christianity," "father's highest education level=finish school/TAFE," "low personal self-efficacy," "father's highest education level=university," **"low personal self-efficacy," "relationship status=≥1year," "recruitment site (reference=secondary school – not sexually active)"** and "previous history of a termination." Items in bold were retained in the model ( $R^2 > 1\%$ ,  $p < 0.05$ ).

Reference category: Female – not sexually active

Table 5.13 details the same multivariable model with the addition of the two other Rasch-derived locations. Correlations between adolescent parenthood attitude location and the two other Rasch-derived locations are provided in Appendix F. Recruitment from an antenatal clinic remained a strong correlate ( $\beta = -1.253$ ,  $R^2$  change=0.204,  $p < 0.001$ ) and was positively associated with support for adolescent parenting. Response to the abortion scale ( $\beta = 0.462$ ,  $R^2$  change=0.164,  $p < 0.001$ ) was also a strong correlate; support for abortion was negatively associated with support for adolescent parenting. Length of relationship, personal self-efficacy score and response to the contraception scale each contributed less than 2% of model variation.

**Table 5.13****AAAP Scale Adjusted Multivariable Linear Regression Model (Comparisons by Sexually Active Duration for Females Only, plus Addition of Other Rasch-derived Locations)**

<i>n</i> =754	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.062</b>		<b>&lt;0.001</b>
Age	0.033		0.052				
ATSI	0.058		0.257				
+Female – sexually active ≥1year	0.308		0.173				
+Female – sexually active (duration data missing)	0.671		0.191				
Relationship status=≥1year	-0.138	-0.429, 0.153	0.148	0.351	0.079	0.018	0.011
Low personal self-efficacy	-0.222	-0.462, 0.018	0.122	0.070	0.094	0.015	0.018
Recruitment site=antenatal clinic	-1.253	-1.645, -0.862	0.199	<0.001	0.290	0.204	<0.001
Adolescent Attitudes towards Abortion score	0.462	0.374, 0.550	0.045	<0.001	0.454	0.164	<0.001
Adolescent Attitudes towards Contraception score	0.353	0.141, 0.565	0.108	<0.001	0.470	0.016	0.001

Note: Variables considered in the model were "religious affiliation=Christianity," "father's highest education level=finish school/TAFE," "low personal self-efficacy," **"relationship status=≥1year," "recruitment site (reference=secondary school – not sexually active)," "previous history of a termination," "Adolescent Attitudes towards Abortion score" and "Adolescent Attitudes towards Contraception score."** Items in bold were retained in the model ( $R^2 > 1\%$ ,  $p < 0.05$ ).

Reference category: Female – not sexually active (Female – sexually active <1year excluded from the model)



Risky sexual behaviours only (sexually active participants)*Linear regression models adjusting for age and ATSI status*

The significant correlates from Table 5.10 were tested individually in a series of linear regressions, with the results presented in Table 5.14. Adjustments were made for age and ATSI status.

**Table 5.14**

**AAAP Scale Adjusted Univariate Linear Regression Models for Sexually Active Females (Comparisons within RSB Categories)**

	B	SE(B)	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>			<b>0.033</b>		<b>0.001</b>
Age	-0.114	0.049			
ATSI	-0.935	0.283			
<b>Plus (added individually):</b>					
Age at sexual debut (vaginal intercourse)	0.772	0.190	0.075	0.042	<0.001
Age at sexual debut (oral sex or vaginal intercourse)	0.631	0.195	0.056	0.023	0.001
Contraception used in past year	0.481	0.230	0.043	0.009	0.037
Contraception used last time had sex	0.667	0.153	0.072	0.039	<0.001
Condoms used in past year	0.549	0.197	0.055	0.021	0.006
Condoms used last time had sex	0.306	0.165	0.042	0.009	0.065
Drunk or high last time had sex	0.492	0.219	0.046	0.013	0.025

Note: Variables entered individually in addition to the Base model. Variables were not tested if they were not found to be statistically significant in Table 5.10

Most variables made a significant and reasonable (>1%) contribution to the prediction of adolescent parenthood attitude location. Positive beta values showed that all correlates increased mean AAAP Scale location, indicating less support for adolescent pregnancy. An adjusted multivariable model (Table 5.15) showed that using contraception at last sexual encounter ( $\beta=0.617$ ,  $R^2$  change=0.044,  $p<0.001$ ), delaying sexual debut until 16 years or older ( $\beta=0.695$ ,  $R^2$  change=0.033,  $p<0.001$ ) and being drunk or high at last sexual encounter ( $\beta=0.586$ ,  $R^2$  change=0.018,  $p=0.010$ ) was associated with less support for adolescent parenting.

**Table 5.15**

**AAAP Scale Adjusted Multivariable Linear Regression Model for Sexually Active Females (Comparisons within RSB Categories)**

	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.026</b>		<b>0.011</b>
Age	-0.150		0.070				
ATSI	-0.816		0.307				
Contraception used last time had sex	0.617	0.294, 0.940	0.164	<0.001	0.070	0.044	<0.001
Age at sexual debut (vaginal intercourse)	0.695	0.317, 1.072	0.192	<0.001	0.03	0.033	<0.001
Drunk or high last time had sex	0.586	0.144, 1.029	0.225	0.010	0.121	0.018	0.010

Note: Variables considered in the model were "age at sexual debut (vaginal intercourse)," "age at sexual debut (oral sex or vaginal intercourse)," "contraception used last time had sex," "condoms used in past year" and "drunk or high last time had sex." Items in bold were retained in the model ( $R^2>1\%$ ,  $p<0.05$ ).

This multivariable linear regression was re-run with the addition of two variables:

"recruitment site" and "history of termination" (Table 5.16). Participants recruited from pregnancy termination clinics were less supportive of adolescent parenthood ( $\beta=0.025$ ,  $R^2$  change=0.114,  $p<0.001$ ) and participants recruited from antenatal clinics were more supportive ( $\beta=-2.024$ ,  $R^2$  change=0.173,  $p<0.001$ ).

Table 5.16

**AAAP Scale Adjusted Multivariable Linear Regression Model for Sexually Active Females (Comparisons within RSB Categories, plus Addition of Recruitment Site)**

<i>n=438</i>	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.026</b>		<b>0.011</b>
Age	-0.115		0.068				
ATSI	-0.182		0.275				
Recruitment site=Termination clinic	0.025	-0.365, 0.414	0.198	0.901	0.140	0.114	<0.001
Recruitment site=Antenatal clinic	-2.024	-2.457, -1.592	0.220	<0.001	0.313	0.173	<0.001
Age at sexual debut (vaginal intercourse) $\geq 16$ years	0.532	0.189, 0.876	0.175	0.002	0.331	0.018	0.002

Note: Variables considered in the model were "age at sexual debut (vaginal intercourse)," "age at sexual debut (oral sex or vaginal intercourse)," "contraception used in past year," "condoms used in past year," "condoms used last time had sex," "drunk or high last time had sex" and "recruitment site." Items in bold were retained in the model ( $R^2>1\%$ ,  $p<0.05$ ).

A previous history of abortion was associated with less support for adolescent parenthood ( $\beta=1.208$ ,  $R^2$  change=0.122,  $p<0.001$ ) (Table 5.17).

Table 5.17

**AAAP Scale Adjusted Multivariable Linear Regression Model for Sexually Active Females (Comparisons within RSB Categories, plus Addition of History of Terminations)**

<i>n=348</i>	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.026</b>		<b>&lt;0.001</b>
Age	-0.273		0.072				
ATSI	-0.517		0.294				
History of terminations	1.208	0.872, 1.543	0.171	<0.001	0.148	0.122	<0.001
Condoms used in past year	0.577	0.191, 0.963	0.196	0.003	0.192	0.043	<0.001
Age at sexual debut (vaginal intercourse) $\geq 16$ years	0.547	0.193, 0.901	0.180	0.003	0.214	0.023	0.002
Contraception used last time had sex	0.419	0.102, 0.736	0.161	0.010	0.228	0.014	0.013
Drunk or high last time had sex	0.465	0.051, 0.879	0.210	0.028	0.239	0.011	0.028

Note: Variables considered in the model were "age at sexual debut (vaginal intercourse)," "age at sexual debut (oral sex or vaginal intercourse)," "contraception used last time had sex," "condoms used in past year," "condoms used last time had sex," "drunk or high last time had sex" and "history of termination." Items in bold were retained in the model ( $R^2>1\%$ ,  $p<0.05$ ).

Table 5.18 details the multivariable regression where recruitment site and history of termination were considered simultaneously; in addition to the two other Rasch-derived locations. As all participants recruited from a pregnancy termination clinic had undergone an abortion, the "history of termination" variable was excluded. Being recruited from a pregnancy termination clinic, an antenatal clinic and abortion attitudes each had the greatest influence on the prediction of mean AAAP Scale location (12.0%, 17.0% and 17.5%

respectively). Recruitment from an antenatal clinic ( $\beta=-1.279$ ,  $R^2$  change=0.170,  $p<0.001$ ) was associated with support for adolescent parenting. Recruitment from a pregnancy termination clinic ( $\beta=0.170$ ,  $R^2$  change=0.120,  $p<0.001$ ) and positive abortion attitudes ( $\beta=0.484$ ,  $R^2$  change=0.175,  $p<0.001$ ) were both associated with less support for adolescent parenting.

Table 5.18

**AAAP Scale Adjusted Multivariable Linear Regression Model for Sexually Active Females (Comparisons within RSB Categories, plus Addition of Other Rasch-derived Locations)**

<i>n</i> =348	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.024</b>		<b>0.018</b>
Age	-0.087		0.059				
ATSI	0.107		0.240				
Recruitment site=Termination clinic	0.170	-0.511, 0.172	0.174	0.329	0.144	0.120	<0.001
Recruitment site=Antenatal clinic	-1.279	-1.681, -0.876	0.205	<0.001	0.314	0.170	<0.001
Age at sexual debut (vaginal intercourse)≥16years	0.358	0.059, 0.656	0.152	0.019	0.322	0.008	0.019
Adolescent Attitudes towards Abortion score	0.484	0.394, 0.575	0.046	<0.001	0.497	0.175	<0.001
Adolescent Attitudes towards Contraception score	0.336	0.147, 0.525	0.096	0.001	0.517	0.020	<0.001

Note: Variables considered in the model were "age at sexual debut (vaginal intercourse)," "age at sexual debut (oral sex or vaginal intercourse)," "contraception used in past ever," "condoms used in past year," "condoms used last time had sex," "drunk or high last time had sex," "recruitment site," "history of termination," "Adolescent Attitudes towards Abortion score" and "Adolescent Attitudes towards Contraception score." Items in bold were retained in the model ( $R^2>1\%$ ,  $p<0.05$ ).

Individual, familial and extrafamilial factors, and risky sexual behaviours combined (sexually active females)

#### *Linear regression models adjusting for age, ATSI status and sexual activity duration*

A selection of significant correlates from Table D.2 was tested univariately (Table 5.19).

Whilst a broad range of variables were tested, Table 5.19 lists only the variables with an  $R^2$  change greater than 1%. The base model adjusted for age, ATSI status and sexual activity duration; and contributed to 4.4% of model variation before addition of the correlates. The significant adjusted univariate linear regressions possessed  $R^2$  change values ranging from 0.012-0.028; with all significant correlates entered into a final multivariable model.

**Table 5.19****AAAP Scale Adjusted Univariate Linear Regression Models for Sexually Active Females (Comparisons by Duration of Sexual Activity)**

	B	SE(B)	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>			<b>0.044</b>		<b>0.001</b>
Age	0.025	0.067			
ATSI	-0.727	0.309			
+Female – sexually active ≥1year	-0.605	0.199			
<b>Plus (added individually):</b>					
Mother smoked ever	-0.397	0.158	0.061	0.017	0.010
Lives with both parents=no	0.383	0.167	0.057	0.013	0.020
Participated in sport/recreation activities during last 12 months	0.351	0.157	0.057	0.013	0.026
SDQ Conduct problems	-0.490	0.179	0.063	0.019	0.007
Low personal self-efficacy	-0.330	0.174	0.056	0.012	0.059
Relationship status=Committed relationship	-0.368	0.160	0.057	0.013	0.022
Current relationships status/duration=≥1year	-0.708	0.211	0.072	0.028	0.001
Age at sexual debut (vaginal intercourse)=≥16years	0.643	0.221	0.065	0.021	0.004
Age at sexual debut (anal intercourse)=≥16years	0.717	0.364	0.083	0.039	0.052
Age at sexual debut=≥16years	0.508	0.226	0.057	0.013	0.025

Note: Variables entered individually in addition to the Base model. Variables were not tested if they were not found to be statistically significant in Table D.2

Whilst a broad range of variables were tested, only the variables with an R<sup>2</sup> change >1% are listed

Reference category: Female – sexually active <1year

Table 5.20 details the final multivariable model. Adjustments were again made for age, ATSI status and sexual activity duration. The base model accounted for 3.4% of model variation. Smoking history of the participant's mother contributed to 1.7% ( $\beta=-0.397$ ,  $p=0.013$ ) of model variation and was positively associated with support for adolescent parenting.

**Table 5.20****AAAP Scale Adjusted Multivariable Linear Regression Model for Sexually Active Females (Comparisons by Duration of Sexual Activity)**

	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.034</b>		<b>0.006</b>
Age	0.001		0.067				
ATSI	-0.528		0.331				
+Female – sexually active ≥1year	-0.509		0.201				
Mother smoked ever	-0.397	-0.708, -0.080	-0.130	0.013	0.050	0.017	0.013

Note: Variables considered in the model were "mother smoked ever," "lives with both parents," "participated in sport/recreation activities during last 12 months," "SDQ conduct problems," "personal self-efficacy," "relationship status," "current relationships status/duration," "age at sexual debut (vaginal intercourse)," "age at sexual debut (anal intercourse)," and "age at sexual debut." Items in bold were retained in the model ( $R^2>1\%$ ,  $p<0.05$ ).

Reference category: Female – sexually active <1year

The two other Rasch-derived locations were then included in the multivariable model; with the results provided in Table 5.21. The AAC Scale location was a strong correlate, contributing to 38% of model variation. Beta values indicate that support for contraception was negatively associated with support for adolescent parenting ( $\beta=0.318$ ,  $p<0.001$ ).

**Table 5.21****AAAP Scale Adjusted Multivariable Linear Regression Model for Sexually Active Females (Comparisons by Duration of Sexual Activity, plus Addition of Other Rasch-derived Locations)**

<i>n</i> =376	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.038</b>		<b>0.004</b>
Age	0.007		0.068				
ATSI	-0.564		0.333				
+Female – sexually active ≥1year	-0.555		0.201				
Mother smoked ever	-0.226	-0.468, 0.016	0.123	0.067	0.056	0.018	0.011
Adolescent Attitudes towards Abortion score	0.638	0.557, 0.720	0.041	<0.001	0.070	0.014	0.023
Adolescent Attitudes towards Contraception score	0.318	0.123, 0.514	0.100	0.002	0.450	0.380	<0.001

Note: Variables considered in the model were **"mother smoked ever," "Adolescent Attitudes towards Abortion score"** and **"Adolescent Attitudes towards Contraception score."** Items in bold were retained in the model ( $R^2 > 1\%$ ,  $p < 0.05$ ).

Reference category: Female – sexually active <1year

### 5.3.3 Summary of adolescent attitudes towards adolescent parenthood

Administration of the AAAP Scale to an adolescent sample found that support for adolescent parenting was most common amongst males (versus females), older females (versus younger females), sexually active females (versus sexually inactive females) and females who had been sexually active for at least a year (versus females who had only commenced sexual activity in the previous 12 months). Whilst males were more supportive of adolescent parenting than females, few explanatory variables demonstrated significant differences in males, prompting the analyses to focus on the female sample.

Amongst sexually active female adolescents, those who had their first sexual experience at an early age and those reporting riskier behaviours in relation to contraceptive and condom use, were all more likely to have positive attitudes towards adolescent parenting. In comparison, sexually active females who reported being drunk or high at last sexual encounter were more likely to support the delay of parenting until post-adolescence. Multiple sex partners in the previous year and a history of unwanted sexual activity was not associated with attitudes towards adolescent parenting.

Support for adolescent parenting was highest amongst females who had a previous pregnancy (resulting in either a live birth or abortion) and lowest amongst those who were sexually active but had never been pregnant.

Quantifying the relative contribution of possible correlates; most demographic factors, psychosocial factors and previous sexual behaviour (including RSB), had minimal or no impact on parenthood attitudes when examined simultaneously. However, being recruited

from an antenatal clinic was strongly associated with a positive attitude towards adolescent parenting. Being recruited from a pregnancy termination clinic, a previous history of abortion, positive abortion attitudes as determined by the AAA Scale and positive contraceptive attitudes as determined by the AAC Scale were each strongly associated with reduced support for adolescent parenting.

## CHAPTER 6

### *Development and Application of the “Adolescent Attitudes towards Contraception Scale”: Methods and Results*

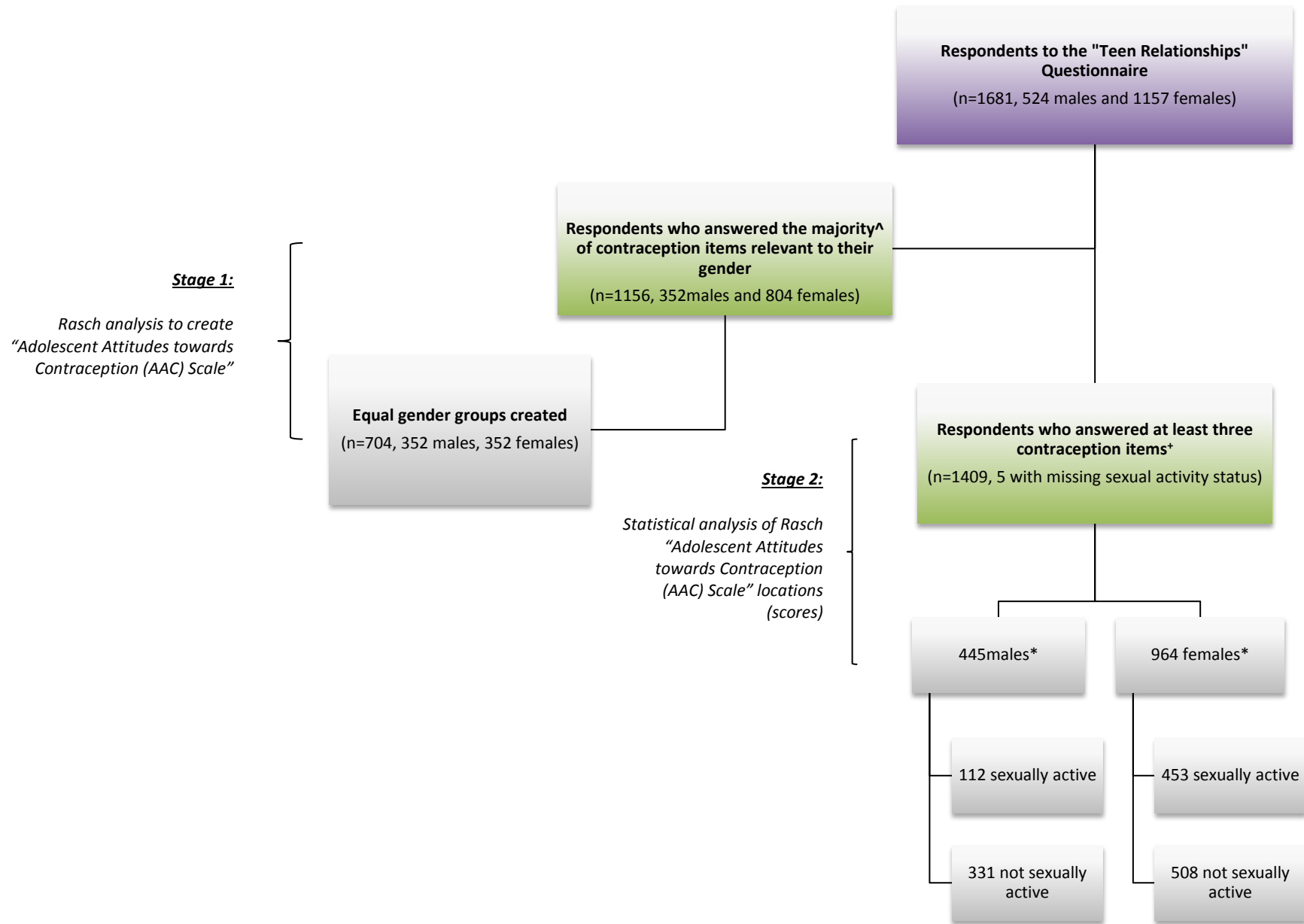
## 6.0 Overview

This chapter details how the Rasch Unidimensional Measurement Model was used to select items to form a scale measuring adolescent attitudes towards contraception, and to examine the psychometric properties of that scale. Linear Rasch scores of contraceptive attitudes were created, with scores (person locations) subjected to traditional statistical analyses. These analyses sought to determine if contraceptive attitudes were associated with a series of possible explanatory variables. The methods and results relevant to these processes are detailed.

### 6.1 Statistical analysis pathway

Data relating to contraception were examined in two stages. Figure 6.1 illustrates the different sample sizes used in the development and analysis of a scale measuring contraceptive attitudes. Stage one involved application of the Rasch Unidimensional Measurement Model to a subset of data collected as part of the “Teen Relationships Study” and led to the development of the “Adolescent Attitudes towards Contraception (AAC) Scale.” Scores (termed person locations or locations) measuring adolescent attitudes towards contraception were derived for all participants, with effort made to establish good construct validity and reliability. In stage two, traditional statistical analyses were applied to the Rasch-derived AAC Scale locations to determine the association between scale scores and a series of individual, familial or extrafamilial factors; or previous engagement in various RSBs.





**Figure 6.1. Sample sizes used for all data relating to contraception.**

^males were required to answer  $\geq 6/9$  items, females were required to answer  $\geq 7/11$  items  
 \*item location values from Stage 1 were anchored to create person location values for all participants in Stage 2  
 \*sexual activity status missing for two males and three females

## 6.2 Stage 1: Rasch analysis to create the “Adolescent Attitudes towards Contraception (AAC) Scale”

### 6.2.1 Method

#### Scale structure

In the “Teen Relationships” questionnaire there were originally 53 attitude and intention items relating to contraception (Appendix A). Use of the RUMM2030 software program resulted in the immediate deletion of 41 extreme items. Items were discarded by the program if the total score for respondents was either all zero or all perfect scores (i.e. everyone either strongly agreed or strongly disagreed)(RUMM Laboratory, 2004). As these items did not discriminate amongst participants (i.e. no comparisons of any two persons could be made), they were unable to be linearised and located on the continuum of items.

Therefore, preliminary analysis of the contraception scale began with 12 attitude and intention items relating to contraception, as listed in Table 6.1. Items were answered on a four-point Likert scale of *strongly disagree* to *strongly agree*, with scoring from 0 to 3 respectively. All items were reverse-scored as indicated by the asterisk (\*). A higher score equated to greater support for the use of contraception. Items preceded by an L were asked of both males and females, B items were only given to boys and G items only given to girls.

**Table 6.1**  
**Original Conceptualisation of the “Adolescent Attitudes towards Contraception (AAC) Scale” (n=12)**

Item	
L4*	Contraception is too expensive (condoms/pill/Implanon)
L21*	If you're drunk using a condom is the last thing that's on your mind
L22*	If you've both been tested, condoms aren't such a big deal
L25*	I don't think contraception's such a big deal when you've been with someone for a long time
L29*	Condoms interrupt the moment
L30*	Sex just seems to happen when you're drunk
L50*	You don't really think about using condoms when you're drinking
L53*	I don't even think about condoms in the heat of the moment
B9*	I think it would be hard for me to get a girl pregnant
B13*	It's hard to talk to girls about contraception
B15*	My parents just lecture me when I bring up stuff about girls and sex
G27*	It's too hard to remember to take the pill every day

\* indicates item is reverse-scored

Items preceded by an L were asked of both males and females, B items were only given to boys only and G items to girls only

### Rasch analyses

All 12 items were entered into the RUMM2030 program (Andrich et al., 2008) for analysis.

A series of checks to determine fit to the Rasch Unidimensional Measurement Model were made. These included assessment of (a) thresholds, (b) individual and overall item fit, (c) Differential Item Functioning, (d) individual and overall person fit, (e) overall fit to the Rasch Model, (f) item threshold/person distribution, and (g) order and location of items. Reliability of the scale was verified using the Person Separation Index (PSI). Chapter Three described how each fit statistic was applied.

## 6.2.2 Results

As outlined in Figure 6.1, the original sample size of 1681 participants was amended so only participants who had answered the majority of items relating to contraception were considered. If the constraints had been changed to be like those imposed in the previous two scales (i.e. only participants who answered all items relevant to their gender) then the male sample would have been reduced to 39. Therefore, it was decided to include participants who had answered at least two-thirds of the items required of their gender. For males, this was at least six out of the nine items administered (n=352) and for females was at least seven out of the eleven items administered (n=804).

From this sample of 1156, even gender groups were created by making a final selection of 704 participants (n=352 males, 352 females). This smaller sample was used for the Rasch analysis of the scale.

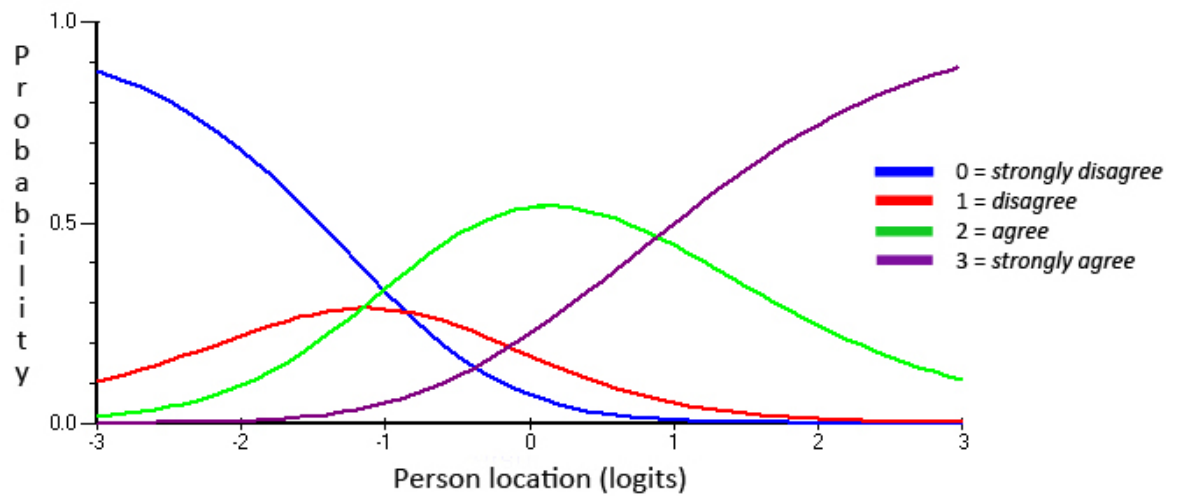
### Thresholds

Table 6.2 illustrates the threshold values for all 12 items; with only item L4 indicating disordered thresholds. The item was rescored by collapsing the *disagree* and *strongly disagree* categories together (i.e. 0/1=0, 2=1, 3=2). Figure 6.2a illustrates the original CCC for item L4 and Figure 6.2b illustrates these same curves once the categories were collapsed. The remainder of the analyses were carried out using the collapsed category data.

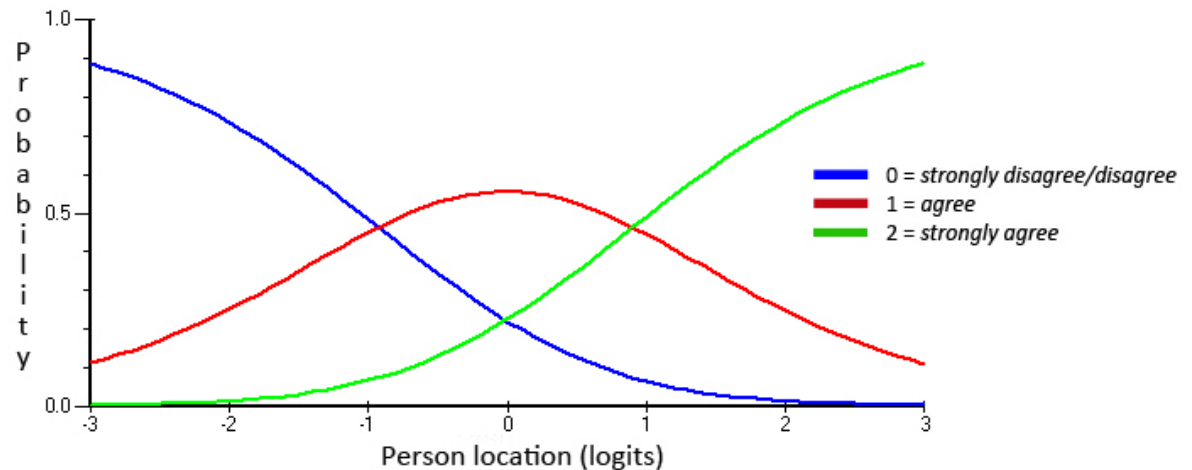
**Table 6.2**  
**Threshold Values for all Initial Items in the AAC Scale (n=12)**

Item	Thresholds		
	1st <i>strongly disagree/ disagree</i>	2nd <i>disagree/ agree</i>	3rd <i>strongly agree/ agree</i>
L4	-0.49	-0.69	1.18 *
L21	-1.38	0.07	1.31
L22	-1.32	-0.36	1.68
L25	-1.70	-0.14	1.84
L29	-1.49	-0.25	1.74
L30	-0.99	0.34	0.66
L50	-0.99	-0.36	1.35
L53	-1.17	-0.18	1.35
B9	-1.14	-0.44	1.59
B13	-1.55	-0.28	1.83
B15	-1.32	-0.35	1.67
G27	-1.41	-0.19	1.60

\* indicates reversed thresholds



**Figure 6.2a.** Category characteristic curve for item L4 ("contraception is too expensive") with disordered thresholds.



**Figure 6.2b.** Category characteristic curve for item L4 ("contraception is too expensive") with ordered thresholds.

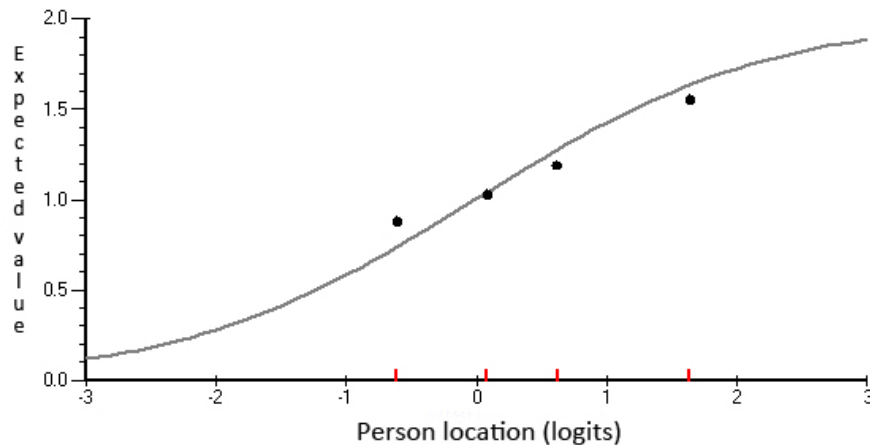
#### Item Fit

Table 6.3 illustrates item fit statistics for all 12 items, sorted by increasing  $\chi^2$  value. Bonferroni adjustments were made to the significance test and all items exhibited high  $\chi^2$  probabilities ( $p > 0.05$ ). Item L4 exhibited a residual higher than the widely accepted range of  $\pm 2.5$  and is therefore highlighted in Table 6.3. All other items exhibited good data to model fit.

**Table 6.3**  
**Item Fit Statistics for all Initial Items in the AAC Scale ( $n=12$ )**

Item	Location	Residual	$\chi^2$	p
L21	0.34	-0.70	2.98	0.70
L25	-0.17	0.05	4.99	0.42
G27	0.09	1.09	5.07	0.41
L30	-0.34	1.37	6.43	0.27
L53	0.00	-1.25	6.55	0.26
L22	-0.57	-1.46	7.80	0.17
L4	-0.04	3.63	8.58	0.13
L29	0.11	-1.22	11.56	0.11
B9	-0.10	1.37	12.41	0.09
B13	0.32	0.31	13.94	0.07
B15	-0.15	1.31	14.80	0.07
L50	0.52	-1.84	16.96	0.06

As the worst performing item, the ICC for L4 (Figure 6.3) was inspected. The item was retained as the ICC illustrates that the mean scores of people in each class interval (represented by a dot) was close to the theoretical curve (represented by the solid line).



**Figure 6.3.** Item characteristic curve for the worst performing item L4 (*"contraception is too expensive"*).

#### Local independence

Item residual correlations were examined and showed no positive values. Six pairs of items were negatively correlated: items L4 and L53Pr (-0.50); items L21 and G27 (-0.30); items L50 and G27 (-0.30); and item B9 with L30Pr (-0.57), L30nPr (-0.36) and L53nPr (-0.36). All correlations were negative, indicating that item pairs were working against each other. These findings did not warrant the examination of sub-scales or the deletion of items.

#### Differential Item Functioning

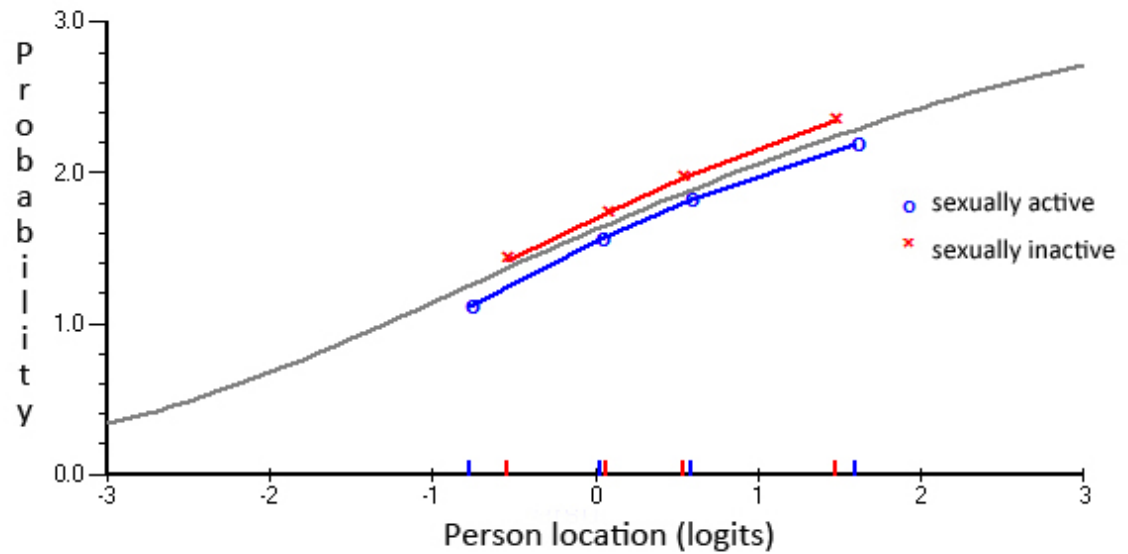
Analyses were performed to assess if there was evidence of DIF between males and females, sexually active and inactive participants or amongst people with different pregnancy histories. An F-test of each item indicated that sub-group variances were not equal for three items, with the results listed in Table 6.4. Items L30 (*"Sex just seems to happen when you're drunk"*) and L53 (*"I don't even think about condoms in the heat of the moment"*) demonstrated DIF amongst participants with different pregnancy histories. Item L25 (*"I don't think contraception's such a big deal when you've been with someone for a long time"*) demonstrated DIF on the basis of sexual activity.

**Table 6.4*****Differential Item Functioning by Gender, Sexual Activity and Pregnancy History for the Interim 12 Items of the AAC Scale***

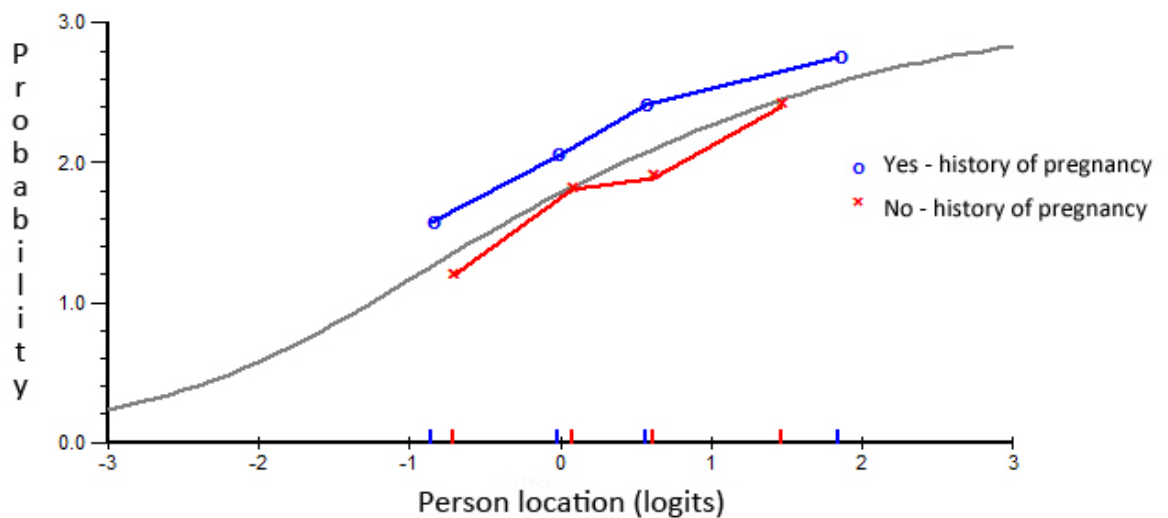
Item	F-test		
	<i>gender</i>	<i>sexual activity</i>	<i>pregnancy history</i>
L4	0.12	0.56	5.16
L21	1.39	0.23	0.43
L22	2.41	2.53	1.14
L25	0.01	14.67*	0.01
L29	0.25	2.01	3.27
L30	3.06	2.54	20.09*
L50	3.33	1.73	2.57
L53	5.35	0.00	13.23*
B9	0.00	2.89	1.14
B13	0.00	6.91	4.64
B15	0.00	0.04	2.06
G27	0.00	1.53	0.43

\*Significant misfit after Bonferroni adjustment

The ICCs for items L25, L30 and L53 illustrate that the DIF was uniform and that the observed means for different sub-groups were systematically different. Figure 6.4 illustrates the ICC for item L25 (*"I don't think contraception's such a big deal when you've been with someone for a long time"*), and shows for persons with the same total score, sexually inactive participants were more likely to endorse the statement than their sexually active counterparts. Figures 6.5 and 6.6 demonstrate that for persons with the same total score, those with a history of pregnancy were more likely to endorse item L30 (*"Sex just seems to happen when you're drunk"*) and less likely to endorse item L53 (*"I don't even think about condoms in the heat of the moment"*) than their peers with no history of pregnancy.

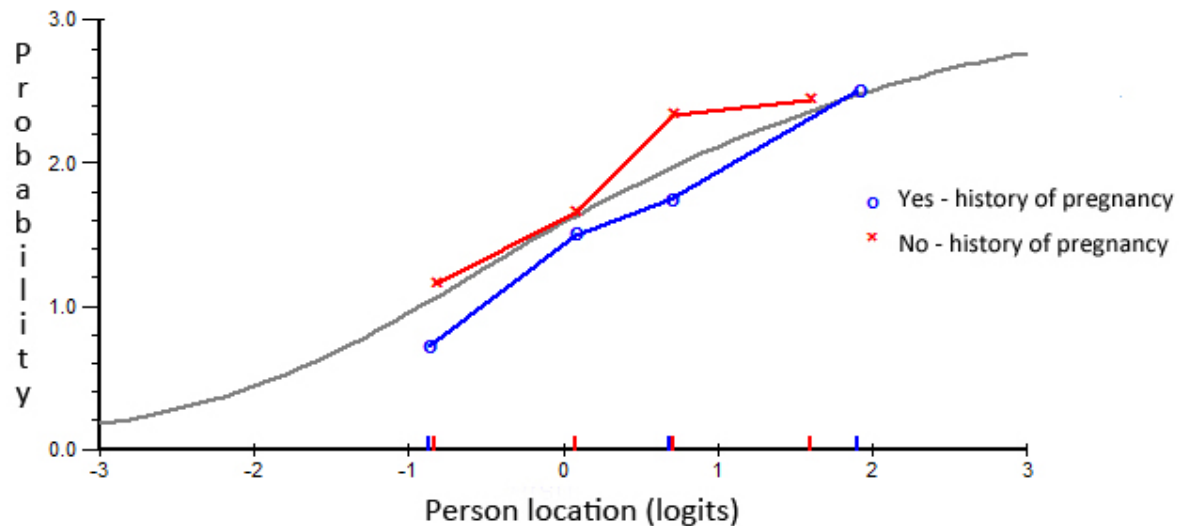


**Figure 6.4.** Item characteristic curve for item L25 ("I don't think contraception's such a big deal when you've been with someone for a long time") illustrating the overall response curve along with the response curves of sexually active and inactive respondents.



**Figure 6.5.** Item characteristic curve for item L30 ("sex just seems to happen when you're drunk") illustrating the overall response curve along with the response curves for respondents with and without a history of pregnancy.





**Figure 6.6.** Item characteristic curve for item L53 ("I don't even think about condoms in the heat of the moment") illustrating the overall response curve along with the response curves for respondents with and without a history of pregnancy.

To address this evidence of DIF, each of the items were split and assessed by the Rasch Model separately. Item L25 was split on the basis of sexual activity to create two new items: L25SA and L25nSA. Participants who were sexually active answered item L25SA, with sexually inactive participants responding to item L25nSA. Responses to items L30 and L53 were split on the basis of pregnancy history to create L30Pr, L30nPr, L53Pr and L53nPr. The responses of participants who had been pregnant were allocated to items L30Pr and L53Pr and the responses of participants who had never been pregnant were allocated to items L30nPr and L53nPr.

Table 6.5 provides the F-test results for the revised set of items and indicates that DIF was no longer evident for any item across gender, sexual activity or pregnancy history. The final set of 15 items is provided in Table 6.6.

Overall item fit to the Rasch Model closely approximated a normal distribution as required. For the final set of 15 items, the mean item fit residual was 0.15 (SD=1.54). The large standard deviation is most likely a result of the high residual evident in item L4 (refer Table 6.3).

**Table 6.5****Differential Item Functioning by Gender, Sexual Activity and Pregnancy History for the Final 15 Items of the AAC Scale**

Item	F-test		
	<i>gender</i>	<i>sexual activity</i>	<i>pregnancy history</i>
L4	0.08	0.17	5.88
L21	1.64	0.04	0.15
L22	2.21	3.72	1.69
L29	0.12	3.12	2.42
L50	3.81	1.30	1.82
B9	0.00	1.90	0.91
B13	0.00	5.28	4.92
B15	0.00	0.03	2.28
G27	0.00	2.03	0.24
L30Pr	1.22	0.00	0.00
L30nPr	0.37	0.00	0.00
L53Pr	1.98	0.00	0.00
L53nPr	0.06	0.00	0.00
L25SA	0.50	0.00	0.11
L25nSA	0.41	0.00	0.00

\* Significant misfit after Bonferroni adjustment

**Table 6.6****Final List of Items for the AAC Scale (n=15)**

Item	
L4*	Contraception is too expensive (condoms/pill/Implanon)
L21*	If you're drunk using a condom is the last thing that's on your mind
L22*	If you've both been tested, condoms aren't such a big deal
L25SA*	I don't think contraception's such a big deal when you've been with someone for a long time (for participants who are sexually active)
L25nSA*	I don't think contraception's such a big deal when you've been with someone for a long time (for participants who are not sexually active)
L29*	Condoms interrupt the moment
L30Pr*	Sex just seems to happen when you're drunk (for participants with a history of pregnancy)
L30nPr*	Sex just seems to happen when you're drunk (for participants with no history of pregnancy)
L50*	You don't really think about using condoms when you're drinking
L53Pr*	I don't even think about condoms in the heat of the moment (for participants with a history of pregnancy)
L53nPr*	I don't even think about condoms in the heat of the moment (for participants with no history of pregnancy)
B9*	I think it would be hard for me to get a girl pregnant
B13*	It's hard to talk to girls about contraception
B15*	My parents just lecture me when I bring up stuff about girls and sex
G27*	It's too hard to remember to take the pill every day

\* indicates item is reverse-scored

Items preceded by an L were asked of both males and females, G items were only given to girls and B items to boys

Person fit

In relation to individual person fit, 108 of the 704 participants had a person fit residual that was outside the range -2.5 to 2.5. Of these, 92 were negative and therefore indicative of a purer Guttman pattern than expected by the Rasch Model (i.e. participants had tended to respond in a fixed or similar way to all items). These participants were retained. Sixteen participants had a residual greater than 2.5 due to inconsistent response patterns which were unexpected under the Rasch Model. As the removal of these persons had no effect on the overall fit of data to the Rasch Model, they were also retained.

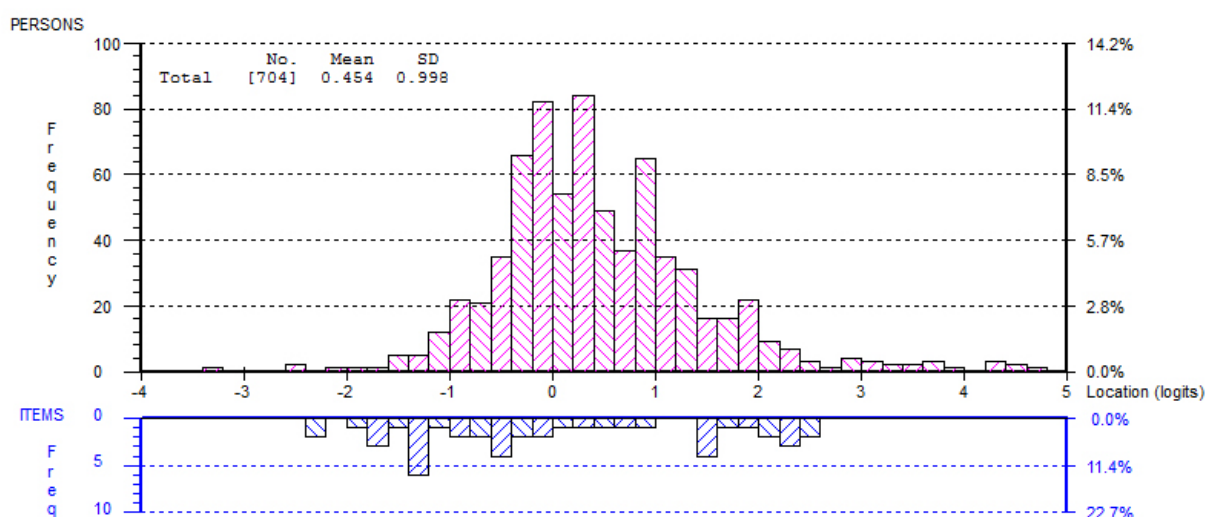
Overall person fit to the Rasch Model was acceptable and closely approximated a normal distribution as required. The mean person fit residual was -0.62 (SD=1.58).

Overall fit to the Rasch Model

The non-significant item-trait interaction test of fit ( $\chi^2=39.27$ ,  $df=45$ ,  $p=0.71$ ) indicated overall fit of the data to the Rasch Model was good. The sample size was modified exclusively for this chi square calculation, as per the recommendations of Andrich and Styles (2009).

Item threshold/person distribution

Figure 6.7 illustrates the person-item threshold location distribution map. The map indicates that items were reasonably well distributed in relation to the persons tested. However, in a similar manner to the AAP Scale, some individuals found the items very easy to endorse and were therefore located beyond the highest item threshold location.



**Figure 6.7.** Person-item threshold distribution map for the AAC scale illustrating person (red) and item (blue) thresholds in logits.

Table 6.7 summarises the comparative mean person locations for different sub-groups within the sample. The greatest support for contraception occurred amongst older participants, females, those from non-ATSI backgrounds, individuals with religious affiliations, those who were sexually active, participants with no history of pregnancy and those who had previously undergone an abortion. A more formal comparison of mean scores, along with the statistical significance, is provided later in this chapter.

**Table 6.7**  
***Score Trends for Different Sub-groups Responding to the AAC Scale***

Support for contraception	
Age	increases with age
Gender	females > males
ATSI status	non-ATSI > ATSI
Religious affiliation	religious > no religion
Sexual activity	sexually active > not yet sexually active
Pregnancy history	never been pregnant > history of pregnancy
Pregnancy outcome	history of terminations only > history of live births only > never been pregnant

#### Order and location of items

Table 6.8 lists the final set of 15 items by increasing location together with the revised response categories. The table shows that for participants with a history of pregnancy, item L30Pr was the "easiest" (or least intense). Item L22 was the next "easiest" item and this was administered to all respondents. For all participants, regardless of their sexual or pregnancy histories, item L50 was the most "difficult" (or most intense) item to agree with. This meant that participants would only require a low level of support for contraception in order to agree with item L22, whereas participants would require a higher level of support for contraception in order to agree with item L50.

**Table 6.8*****Final List of Items for the AAC Scale (Location Order) (n=15)***

	Item	Response categories	Location
L30Pr*	I don't think contraception's such a big deal when you've been with someone for a long time (for participants with a history of pregnancy)	SD, D, A, SA	-0.80
L22*	If you've both been tested, condoms aren't such a big deal	SD, D, A, SA	-0.53
L25nSA*	I don't think contraception's such a big deal when you've been with someone for a long time (for participants who are not sexually active)	SD, D, A, SA	-0.33
L53nPr*	I don't even think about condoms in the heat of the moment (for participants with no history of pregnancy)	SD, D, A, SA	-0.17
B15*	My parents just lecture me when I bring up stuff about girls and sex	SD, D, A, SA	-0.12
B9*	I think it would be hard for me to get a girl pregnant	SD, D, A, SA	-0.08
L4*	Contraception is too expensive (condoms/pill/Implanon)	SD/D, A, SA	-0.01
L30nPr*	Sex just seems to happen when you're drunk (for participants with no history of pregnancy)	SD, D, A, SA	0.05
L25SA*	I don't think contraception's such a big deal when you've been with someone for a long time (for participants who are sexually active)	SD, D, A, SA	0.12
G27*	It's too hard to remember to take the pill every day	SD, D, A, SA	0.12
L29*	Condoms interrupt the moment	SD, D, A, SA	0.15
B13*	It's hard to talk to girls about contraception	SD, D, A, SA	0.33
L53Pr*	I don't even think about condoms in the heat of the moment (for participants with a history of pregnancy)	SD, D, A, SA	0.34
L21*	If you're drunk using a condom is the last thing that's on your mind	SD, D, A, SA	0.37
L50*	You don't really think about using condoms when you're drinking	SD, D, A, SA	0.56

\*indicates item is reverse-scored

Items preceded by an L were asked of both males and females, G items were only given to girls and B items to boys  
SD=strongly disagree, D=disagree, A=agree, SA=strongly agree

The patterning in the location of items, according to content, appears quite random. For example, items relating specifically to the use of condoms (items L22, L53, L29, L21 and L50) occur across the spectrum of item locations. Items relating to drinking and sexual activity (items L30Pr and L50) occur at the extremes.

For items L25, L30 and L53, where a person's sexual or pregnancy history needed to be disclosed, Table 6.8 illustrates that the location of these items is markedly different dependent on this history. For item L25 (*"I don't think contraception's such a big deal when you've been with someone for a long time"*), sexually active participants (L24SA) found it harder to agree to this item than their peers who were not sexually active (L24nSA). For item L30 (*"I don't think contraception's such a big deal when you've been with someone for a long time"*), those with a history of pregnancy found it easier to agree with the item than those who had never been pregnant. Conversely, for item L53 (*"I don't even think about condoms in the heat of the moment"*), those with a history of pregnancy found the item harder to agree with.

Similar to AAAP Scale, items were located over a narrow spread of only -0.80 – 0.56 logits. However, the threshold locations that were illustrated in Figure 6.7 showed a wider distribution that matched the spread of person locations well, except for the participants showing the greatest support for the use of contraception.

#### Construct validity and reliability

Using Messick's (1989) principles of construct under-representation and construct-irrelevant variance, a reasonable degree of construct validity was established. All misfitting items were removed so the final set of items showed good internal consistency; the item difficulty hierarchy and mean person locations for different sub-groups made sense intuitively; and the person-item threshold distribution map (Figure 6.7) showed that item locations and person locations were closely aligned.

Reliability of the AAC Scale was verified through an acceptable PSI of 0.70.

### **6.2.3 Summary of AAC scale development**

The Rasch Unidimensional Measurement Model was applied to data collected from the “Teen Relationships Study,” to create a 15 item scale measuring adolescent attitudes towards contraception. The scale was entitled the “Adolescent Attitudes towards Contraception (AAC) Scale” and its measurement properties were examined through use of the software program RUMM2030 (Andrich et al., 2008).

Due to the presence of DIF, item L25 was split on the basis of sexual activity and items L30 and L53 were split on the basis of pregnancy history.

A reasonable degree of internal consistency (part of the evidence for construct validity) and reliability was established for this scale. Assessment of persons and items on the same continuum indicated that future versions of the scale could include items that target individuals who more strongly support the use of contraception. As many of the items were so closely located next to each other, some could be removed without affecting the overall performance of the scale. Further Rasch analyses would be required to ensure the overall performance of an amended scale was not compromised.

The fit statistics indicated that the final set of items selected to form the scale provided an effective tool for the measurement of attitudes towards contraception. The scale was shown to be unidimensional and interval-level locations of attitude were obtained.

## 6.3 Stage 2: Statistical analysis of Rasch AAC scale scores (locations)

### 6.3.1 Method

The final locations ( $n=704$ ) for each of the 15 items were anchored<sup>9</sup> to produce a location for every person in the original sample of 1681 participants. This meant that an attitude location could be derived for every participant, even if they had not answered at least two-thirds of the items relating to contraception that were relevant to their gender. However, participants who had answered fewer than three contraception items were then omitted from all further analyses due to their assumed limited engagement with the questionnaire.

Locations were entered into PASW v18.0 (IBM SPSS Inc., 2009) to enable the remaining research objectives to be investigated. All location values were relative, with a higher location indicating greater support for contraceptive use. As stated previously, it is incorrect to assume that a location of zero equated to a neutral stance, and that a positive or negative location definitively indicated either support or opposition to the use of contraception. The level of support for contraception (as indicated by AAC Scale location) encompassed both barrier and hormonal methods.

A series of comparative means between different groups, as documented in Chapter Three, were conducted; using t-tests or one-way ANOVA as appropriate.

A predicted value of the AAC Scale location was calculated based on a linear combination of independent explanatory variables. A series of adjusted univariate and multivariable analyses were undertaken to quantify the relative contribution of correlates. The guidelines for these regressions were detailed in Chapter Three. All multivariable models were replicated with the addition of the two other Rasch locations (i.e. locations from the “Adolescent Attitudes towards Abortion Scale” and the “Adolescent Attitudes towards Adolescent Parenthood Scale”).

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<sup>9</sup> Through a process of item anchoring, Rasch analysis software allows the user to input known values (e.g. anchored item locations) so output (e.g. person locations) can be validly equated (T. G. Bond & Fox, 2001; RUMM Laboratory, 2009; Wolfe, 2000).

### 6.3.2 Results

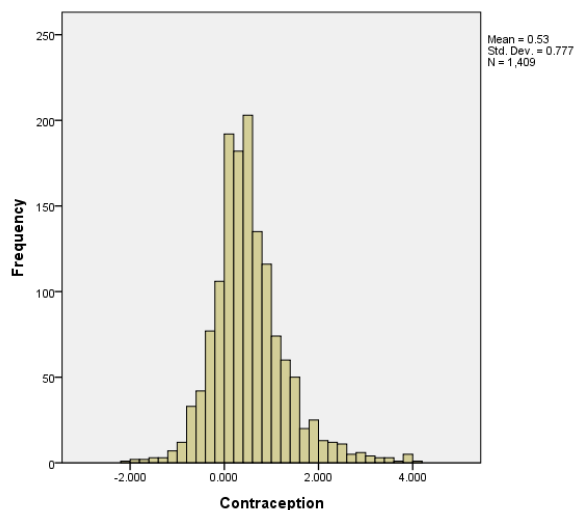
As illustrated in Figure 6.1, anchoring of items for 704 participants produced a contraception attitude location for 1409 individuals, of whom 445 were male (112 sexually active, 331 not sexually active) and 964 were female (453 sexually active, 508 not sexually active). Data on sexual activity status were absent for two males and three females. A participant was classified as sexually active if they had engaged in oral and/or vaginal intercourse.

Table 6.9 details the measures of central tendency for the AAC Scale locations. For all participants the mean scale location was 0.23 logits (SD=0.78). Females (0.66) tended to score higher than males (0.26), indicating greater support for the use of contraception ( $p<0.001$ ).

**Table 6.9**  
*Measures of Central Tendency for AAC Scale Locations (n=1409)*

	n	Mean (SD)	Median (IQR)	Min-Max
<b>All participants</b>	1409	0.23 (0.78)	0.47 (0.04, 0.88)	-2.13, 4.10
<b>Males</b>	445	0.26 (0.61)	0.19 (-0.07, 0.58)	-1.81, 3.08
<b>Females</b>	964	0.66 (0.81)	0.58 (0.16, 1.05)	-2.13, 4.09

Locations appeared to be close to a normal distribution and so no data transformation was performed. Figures 6.8– 6.10 illustrate the histograms and the quantile-quantile (Q-Q) plot that confirm this distribution.



**Figure 6.8.** Distribution of AAC scale locations for all participants (n=1409).



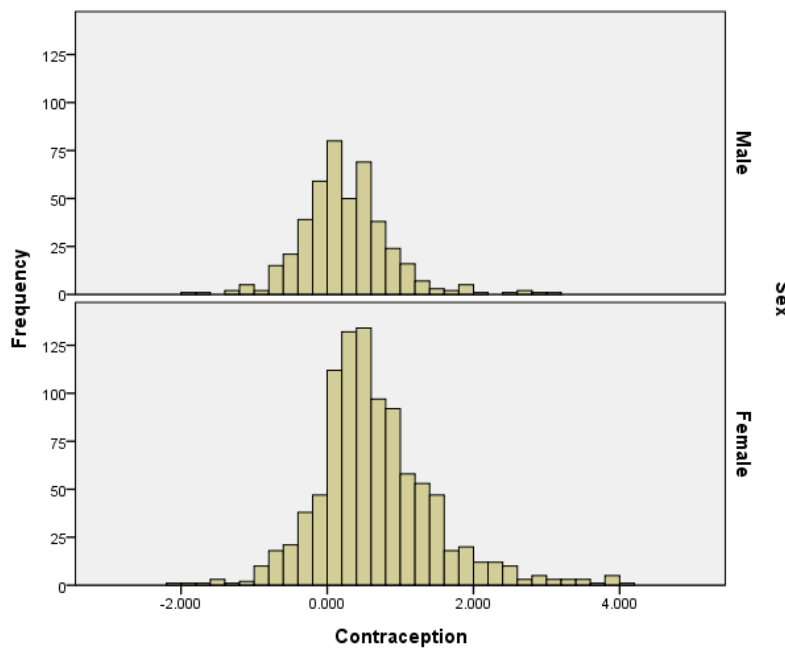


Figure 6.9. Distribution of AAC scale locations for all males (n=445) and females (n=964).

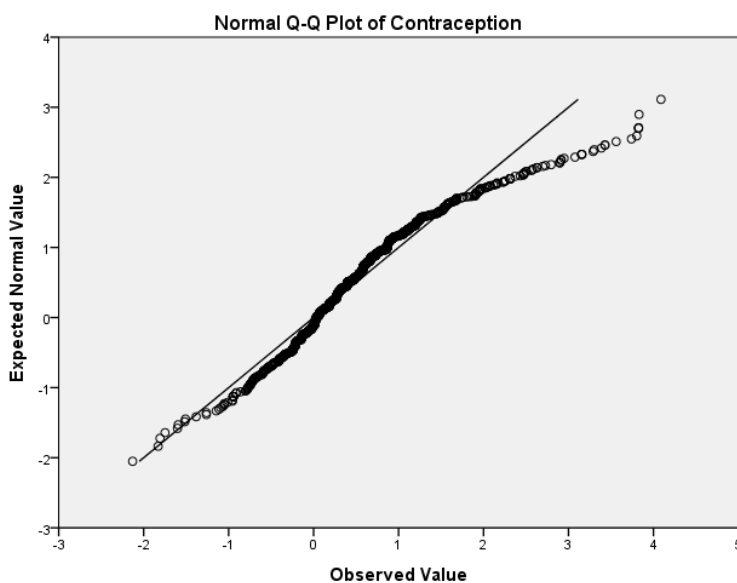


Figure 6.10. Q-Q Plot of AAC scale locations.

### 6.3.2.1 Comparative means of AAC scale locations

#### Attitudes towards Contraception by age (males and females separately)

The mean person locations for the AAP Scale across different age groupings are provided in Table 6.10. Amongst males, support for the use of contraception was highest amongst the

older age groups ( $p=0.009$ ). Amongst females, support fluctuated and was highest amongst those aged 14-15 years ( $p=0.028$ ). Further revision of the age parameters, for the female sample, indicated that younger females were more supportive of contraception than their older peers ( $\leq 15$  years=0.71,  $\geq 16$  years=0.57,  $p=0.028$ ).

**Table 6.10**  
**Rasch Mean AAC Scale Locations (Comparisons by Age within Gender) ( $n=1409$ )**

	Mean (SD)	p
<b>MALES</b>		
$\leq 13$ years	0.16 (0.69)	
14-15 years	0.23 (0.65)	
$\geq 16$ years	0.50 (0.71)	0.009
<b>FEMALES</b>		
$\leq 13$ years	0.63 (0.94)	
14-15 years	0.66 (0.90)	
$\geq 16$ years	0.57 (0.72)	0.028
$\leq 15$ years	0.71 (0.87)	
$\geq 16$ years	0.57 (0.72)	0.028

#### Attitudes towards Contraception by sexual activity status (males and females separately)

For males and females separately, the mean locations of sexually active participants were compared to those of non-sexually active participants. Data on sexual activity status were absent for two males and three females, reducing the sample size for this analysis to 1404. Results are provided in Appendix E (Table E.1).

Amongst males, sexually active participants (0.36) were more supportive of contraception than their peers who were not sexually active (0.22,  $p=0.042$ ). Personal history, family history, alcohol and/or other drug use, family functioning, neighbourhood factors, school factors, psychological profiles, friendships, romantic relationships, sexual behaviour and actual desire to become a parent soon were all considered as comparative variables. Sexually active males were more supportive of contraception in 75/80 variables. However, this finding was statistically significant in approximately one-third of cases.

Amongst females, the overall trend was for sexually active females to be less supportive of contraception than their sexually inactive peers (not sexually active=0.80, sexually active=0.50,  $p<0.001$ ). This trend continued across nearly every comparative variable and was statistically significant for most variables.

Attitudes towards Contraception by sexual activity duration (sexually active females)

Sexually active participants were compared by sexual activity duration (i.e. sexually active <1yr or sexually active ≥1yr) using the same composite variable that has been explained in previous chapters. Implementation of the duration composite variable reduced the sample from 453 sexually active females to 378, and 112 sexually active males to 61.

It was decided to only examine females by sexual activity duration due to the limited male data that resulted from application of the composite variable and the lack of significantly different variables amongst males (Table E.1).

The results for this analysis are provided in Appendix E (Table E.2). Amongst sexually active females, those who had only recently begun sexual activity were more supportive of using contraception (sexually active <1yr= 0.60, sexually active ≥1yr=0.45,  $p=0.040$ ). This trend remained evident regardless of personal history, family history, alcohol and/or other drug use, family functioning, neighbourhood factors, school factors, psychological profiles, friendships, romantic relationships, sexual behaviour or actual desire to become a parent soon. These results were statistically significant for 46/87 (53%) variables examined. In instances where the longer-term sexually active were more supportive of using contraception the results were not significant.

Attitudes towards Contraception by risky sexual behaviour (sexually active participants)

For all sexually active participants, mean AAC Scale locations within selected RSB categories were compared (Table 6.11). For each RSB category, the riskiest behaviour is listed first.

**Table 6.11****Rasch Mean AAC Scale Locations for Sexually Active Participants (Comparisons within RSB Categories)**

Note: Riskier behaviour is listed first

Note: Riskier behaviour is listed first				
Correlate		n	Mean (SD)	p
COMMENCEMENT OF SEXUAL ACTIVITY AT AN EARLY AGE				
Age at sexual debut (vaginal intercourse)	≤15	335	0.45 (0.61)	0.301
	≥16	100	0.52 (0.61)	
Age at sexual debut (oral sex or vaginal intercourse)	≤15	448	0.46 (0.59)	0.300
	≥16	85	0.53 (0.60)	
FAILURE TO CONSISTENTLY USE CONDOMS OR OTHER CONTRACEPTIVES				
Contraception used in past ever	No	53	0.16 (0.79)	<0.001
	Yes	512	0.50 (0.56)	
Contraception used last time had sex	No	159	0.39 (0.69)	0.049
	Yes	405	0.50 (0.55)	
Oral contraceptive pill used in past ever	No	413	0.46 (0.61)	0.413
	Yes	152	0.50 (0.53)	
Oral contraceptive pill used last time had sex	No	505	0.46 (0.60)	0.166
	Yes	59	0.57 (0.49)	
Condoms used in past ever	No	232	0.37 (0.61)	<0.001
	Yes	333	0.54 (0.57)	
Condoms used in past year	Never	62	0.29 (0.73)	0.009
	Sometimes	221	0.44 (0.59)	
	Always	126	0.61 (0.55)	
	Sometimes/never	283	0.41 (0.63)	0.002
	Always	126	0.61 (0.55)	
Condoms used last time had sex	No	228	0.36 (0.63)	<0.001
	Yes	204	0.58 (0.56)	
A HISTORY OF MULTIPLE SEX PARTNERS				
Number of oral sex partners in past year	≥3	116	0.32 (0.61)	0.003
	1-2	353	0.50 (0.57)	
	0	92	0.54 (0.62)	
Number of sexual partners in past year (vaginal intercourse)	>1	323	0.47(0.58)	0.249
	1	242	0.48 (0.61)	
	≥3	108	0.34 (0.64)	0.046
	2	71	0.54 (0.51)	
	1	242	0.48 (0.61)	
Number of sexual partners in past year (oral sex or vaginal intercourse)	≥3	155	0.36 (0.62)	0.006
	1-2	368	0.51 (0.57)	
	0	42	0.56 (0.61)	
SEXUAL ACTIVITY WHILST UNDER THE INFLUENCE OF DRUGS AND/OR ALCOHOL				
Drunk or high last time had sex	Yes	69	0.37 (0.59)	0.171
	No	361	0.48 (0.61)	
UNWANTED SEXUAL ENCOUNTER				
Ever had unwanted sex	Yes	161	0.33 (0.60)	0.001
	No	282	0.53 (0.59)	

Age of sexual debut ( $p=0.300$ ) and being drunk or high at last sexual encounter ( $p=0.171$ ) had no statistically significant effect on attitudes towards contraception.

Participants who used some form of protection at last sexual encounter (condoms  $p<0.001$ , contraception  $p=0.049$ ) or in the past ever (condoms  $p<0.001$ , contraception  $p<0.001$ ) were more supportive of contraception than participants who had never used such methods. Use of the oral contraceptive pill at last sexual encounter ( $p=0.166$ ) or in the past ever ( $p=0.413$ ) was not associated with attitudes towards contraception.

Participants with the greatest number of partners in the past year (oral or vaginal) were less supportive of contraception ( $p=0.006$ ).

An unwanted sexual encounter was associated with less support for contraception ( $p=0.001$ ).

#### Attitudes towards Contraception by pregnancy outcome (sexually active females)

For sexually active females only, mean AAC Scale locations were compared across different pregnancy outcomes. There was no statistically significant effect on attitudes towards contraception across three different categories of pregnancy history (Table 6.12,  $p=0.497$ ).

**Table 6.12.**

***Rasch Mean AAC Scale Locations for Females (Comparisons by Pregnancy History) (n=453)***

	%	Mean (SD)	p
<b>PREGNANCY STATUS</b>			
Sexually active never pregnant	39	0.54 (0.51)	0.497
Sexually active pregnant terminated	42	0.47 (0.63)	
Sexually active pregnant continued	17	0.52 (0.66)	

### 6.3.2.2 Linear regressions

#### Individual, familial and extrafamilial factors only (all participants)

*Linear regression models adjusting for gender, age, ATSI status, sexual activity and sexual activity duration*

A selection of significant variables from Table E.1 was tested univariately in a linear regression model. Univariate linear regressions were run for all participants (Table E.3).

Whilst many variables exhibited a significant difference in mean AAC Scale location, the  $R^2$  change value was  $<1\%$  in all cases, except for “SDQ Total Difficulties<sup>10</sup>” ( $R^2$  change = 0.015).

<sup>10</sup> The “SDQ Total Difficulties” score is a sub-scale of the Strengths and Difficulties Questionnaire (Goodman, 1999). A high total difficulty score may be associated with a clinically significant issue such as depression.

Therefore, the multivariable model considered all variables that had a significant F change ( $p < 0.05$ ), regardless of the magnitude of  $R^2$ .

In the final adjusted multivariable model (Table 6.13), low self-esteem on the Rosenberg scale contributed to 1.5% of model variation ( $\beta = -0.177$ ,  $p < 0.001$ ) and was associated with less support for contraception. All other variables that had been considered had an  $R^2$  change that was  $< 1\%$  or a significance that was not  $p < 0.05$ . When the two other Rasch-derived locations were added to this adjusted multivariable model, they did not make a reasonable ( $> 1\%$ ) or significant ( $p < 0.05$ ) contribution and so were excluded.

Table 6.13

*AAC Scale Adjusted Multivariable Linear Regression Models (Comparisons by Sexually Active Status)*

<i>n=1073</i>	B	95% CI (B)	SE(B)	p	$R^2$	$R^2$ change	p (F change)
<b>BASE model:</b>					<b>0.095</b>		<b>&lt;0.001</b>
Age	0.016		0.026				
ATSI	0.024		0.119				
+Female – sexually active <1year	-0.030		0.106				
+Female – sexually active $\geq 1$ year	-0.282		0.096				
+Male – sexually active	-0.459		0.093				
+Male – not sexually active	-0.584		0.063				
+Female – sexually active (duration data missing)	-0.135		0.105				
Low self-esteem	-0.177	-0.313, -0.041	0.069	0.011	0.110	0.015	<b>&lt;0.001</b>

Note: Variables considered in the model were "mother working," "ever smoked," "ever used illicit drugs," "parents would find out if drank alcohol," "ask parents for help with personal problems," "family rules are clear," "parents control everything," "parents overprotect," "safe neighbourhood," "violence (any) in neighbourhood," "domestic violence in neighbourhood," "ever skipped school," "low personal self-efficacy," "**low self-esteem**," "low self-esteem (males)," "SDQ Emotional difficulties," "SDQ Conduct problems," "SDQ Hyperactivity," "SDQ Hyperactivity (males)," "SDQ Peer problems," "SDQ Prosocial," "SDQ Total difficulties," "SDQ Total difficulties (females)," "importance of friendships," "friends mainly from school," "friends mainly of same age," "current relationship status= $< 1$  year." Items in bold were retained in the model ( $R^2 > 1\%$ ,  $p < 0.05$ ).

Reference category: Female – not sexually active

### Risky sexual behaviours only (sexually active participants)

#### *Linear regression models adjusting for age and ATSI status*

The significant correlates from Table 6.11 were tested individually in a series of linear regressions, with the results presented in Table 6.14. Adjustments were made for gender, age and ATSI status.

**Table 6.14****AAC Scale Adjusted Univariate Linear Regression Models for Sexually Active Participants (Comparisons within RSB Categories)**

	B	SE(B)	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>			<b>0.061</b>		<b>&lt;0.001</b>
Age	-0.035	0.016			
ATSI	-0.011	0.096			
+Male – sexually active	-0.428	0.045			
<b>Plus (added individually):</b>					
Contraception used in past ever	0.353	0.084	0.042	0.030	<0.001
Contraception used last time had sex	0.119	0.058	0.008	0.007	0.041
Condoms used in past ever	0.173	0.052	0.031	0.019	0.001
Condoms used in past year	0.089	0.071	0.062	0.001	0.212
Condoms used last time had sex	0.159	0.052	0.028	0.016	0.002
Number of oral sex partners in past year=1	-0.075	0.055	0.065	0.001	0.175
Number of oral sex partners in past year=2	-0.091	0.085	0.065	0.001	0.281
Number of oral sex partners in past year=≥3	-0.227	0.074	0.068	0.006	0.002
Number of vaginal intercourse partners in past year=1	-0.119	-0.058	0.064	0.003	0.042
Number of vaginal intercourse partners in past year=2	-0.032	0.094	0.061	-	0.737
Number of vaginal intercourse partners in past year=≥3	-0.275	0.078	0.069	0.008	<0.001
Number of sexual partners in past year (oral sex or vaginal intercourse)=1	-0.91	0.055	0.063	0.002	0.098
Number of sexual partners in past year (oral sex or vaginal intercourse)=2	-0.029	0.080	0.061	-	0.713
Number of sexual partners in past year (oral sex or vaginal intercourse)=≥3	-0.224	0.066	0.068	0.008	0.001

Note: Variables entered individually in addition to the Base model. Variables were not tested if they were not found to be statistically significant in Table 6.11

Reference category: Female – sexually active

Three variables made a significant and reasonable (>1%) contribution to the prediction of a contraception attitude location: “*contraception used in the past ever*” ( $\beta=0.353$ ,  $R^2$  change=0.030,  $p<0.001$ ), “*condoms used in the past ever*” ( $\beta=0.173$ ,  $R^2$  change=0.019,  $p=0.001$ ) and “*condoms used last time had sex*” ( $\beta=0.159$ ,  $R^2$  change=0.016,  $p=0.002$ ). All correlates increased the mean AAC Scale location, as evidenced by their positive beta values. This indicated that previous use of contraception was associated with greater support for the use of contraception.

When these variables were considered in an adjusted multivariable model (Table 6.15) having ever used contraception ( $\beta=0.360$ ,  $R^2$  change=0.044,  $p<0.001$ ) and using condoms at last sexual encounter ( $\beta=0.185$ ,  $R^2$  change=0.016,  $p=0.002$ ) each contributed to model variation and were associated with greater support for contraception.

**Table 6.15****AAC Scale Adjusted Multivariable Linear Regression Model for Sexually Active Participants (Comparisons within RSB Categories)**

<i>n</i> =561	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.012</b>		<b>0.089</b>
Age	-0.011		0.019				
ATSI	0.040		0.096				
+Male – sexually active	-0.175		0.067				
Contraception used in past ever	0.360	0.196, 0.524	0.084	<0.001	0.045	0.033	<0.001
Condoms used last time had sex	0.185	0.068, 0.303	0.060	0.002	0.061	0.016	0.002

Note: Variables considered in the model were **"contraception used in the past ever,"** "condoms used in the past ever," and **"condoms used last time had sex."** Items in bold were retained in the model ( $R^2 > 1\%$ ,  $p < 0.05$ ).

Reference category: Female – sexually active

This multivariable linear regression was re-run with the addition of the two other Rasch-derived locations: AAA Scale score and AAAP Scale score (Table 6.16). The influence of abortion score was not significant and was therefore removed. Support for adolescent parenting, as evidenced by a low AAAP Scale score, was negatively associated with contraception score ( $\beta = -0.100$ ,  $R^2$  change = 0.044,  $p < 0.001$ ).

**Table 6.16****AAC Scale Adjusted Multivariable Linear Regression Model for Sexually Active Participants (Comparisons within RSB Categories, plus Addition of Other Rasch-derived Locations)**

<i>n</i> =561	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.009</b>		<b>0.165</b>
Age	0.004		0.019				
ATSI	0.046		0.097				
+Male – sexually active	-0.136		0.067				
Contraception used in past ever	0.327	0.165, 0.489	0.083	<0.001	0.044	0.035	<0.001
Condoms used last time had sex	0.164	0.047, 0.282	0.060	0.006	0.060	0.016	0.002
Adolescent Attitudes towards Adolescent Parenthood score	0.100	0.062, 0.139	0.019	<0.001	0.104	0.044	<0.001

Note: Variables considered in the model were **"contraception used in the past ever,"** "condoms used last time had sex," "Adolescent Attitudes towards Abortion score" and **"Adolescent Attitudes towards Adolescent Parenthood score."** Items in bold were retained in the model ( $R^2 > 1\%$ ,  $p < 0.05$ ).

Reference category: Female – sexually active

Individual, familial and extrafamilial factors, and risky sexual behaviours combined (sexually active females)

*Linear regression models adjusting for age, ATSI status and sexual activity duration*

A selection of significant correlates from Table E.2 was tested univariately (Table 6.17). Table E.2 had reported mean locations for the AAC Scale by sexual activity duration for females only. Whilst a broad range of variables were tested, Table 6.17 lists only the variables with an  $R^2$  change greater than 1%. The base model adjusted for age, ATSI status and sexual activity duration; and contributed to 1.2% of model variation before addition of the correlates.



**Table 6.17****AAC Scale Adjusted Univariate Linear Regression Models for Sexually Active Females (Comparisons by Duration of Sexual Activity)**

	B	SE(B)	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>			<b>0.012</b>		<b>0.032</b>
Age	-0.012	0.027			
ATSI	0.048	0.128			
+Female – sexually active ≥1year	-0.137	0.082			
<b>Plus:</b>					
Ask parents for help with personal problems	0.151	0.076	0.024	0.011	0.049
Parents overprotect	-0.180	0.076	0.027	0.015	0.019
Participated in youth group activities during last 12 months	-0.134	0.081	0.022	0.010	<0.001
Low personal self-esteem	-0.248	0.076	0.043	0.031	0.001
SDQ Emotional difficulties	-0.213	0.068	0.037	0.025	0.002
SDQ Peer problems	-0.175	0.071	0.028	0.016	0.015
SDQ Total difficulties	-0.315	0.062	0.077	0.065	<0.001
Low self-efficacy	-0.247	0.066	0.057	0.045	<0.001
Experienced negative treatment by others	-0.744	0.343	0.030	0.019	0.031
Current relationship status/duration= <1yr	-0.245	0.080	0.029	0.017	0.013
Number of oral sex partners in previous year=≥3	-0.251	0.079	0.039	0.026	0.002
Number of people had vaginal intercourse with in last year=≥3	-0.181	0.074	0.028	0.016	0.016
Number of people had any form of sexual intercourse with in last year=≥3	-0.195	0.071	0.032	0.020	0.006
Reason for unwanted sex=drunk or high	0.190	0.085	0.047	0.035	<0.001
Never used contraception	-0.436	0.098	0.063	0.051	<0.001

Note: Variables entered individually in addition to the Base model. Variables were not tested if they were not found to be statistically significant in Table E.2

Whilst a broad range of variables were tested, only the significant variables with an R<sup>2</sup> change >1% are listed

Reference category: Female – sexually active <1year

All significant correlates were entered into a final multivariable model (Table 6.18).

Adjustments were again made for age, ATSI status and sexual activity duration. The base model accounted for 2.1% of model variation. Scoring highly on the SDQ Total difficulties<sup>11</sup> accounted for 5% of model variation ( $\beta=-0.182$ ,  $p<0.001$ ), low self-efficacy<sup>12</sup> contributed 2.3% ( $\beta=-0.172$ ,  $p=0.008$ ), three or more oral sex partners in the previous 12 months contributed 2.3% ( $\beta=-0.246$ ,  $p=0.007$ ) and participation in youth group activities contributed 1% ( $\beta=-0.135$ ,  $p=0.044$ ). The presence of each variable was negatively associated with support for the use of contraception.

<sup>11</sup> Total difficulties sub-scale derived from Strengths and Difficulties Questionnaire (Goodman, 1999)

<sup>12</sup> Score derived from Cowen's Personal Self-Efficacy Scale (Cowen et al., 1991)

**Table 6.18****AAC Scale Adjusted Multivariable Linear Regression Model for Sexually Active Females (Comparisons by Duration of Sexual Activity)**

<i>n</i> =374	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.021</b>		<b>0.046</b>
Age	-0.013		0.028				
ATSI	-0.154		0.132				
+Female – sexually active ≥1year	-0.137		0.085				
SDQ Total difficulties	-0.182	-0.319, -0.045	0.069	0.009	0.071	0.050	<0.001
Low self-efficacy	-0.172	-0.303, -0.040	0.067	0.011	0.094	0.023	0.008
Number of oral sex partners in previous year=≥3	-0.246	-0.407, -0.084	0.082	0.003	0.118	0.023	0.007
Participated in youth group activities during last 12 months	-0.135	0.048, 0.342	0.075	0.010	0.128	0.010	0.044

Note: Variables considered in the model were "ask parents for help with personal problems," "parents overprotect," **"participated in youth group activities during last 12 months,"** "low personal self-esteem," "SDQ Emotional difficulties," "SDQ Peer problems," **"SDQ Total difficulties,"** **"low self-efficacy,"** "experienced negative treatment by others," "current relationship status/duration," **"number of oral sex partners in previous year,"** "number of people had vaginal intercourse with in last year," "number of people had any form of sexual intercourse with in last year," "reason for unwanted sex" and "never used contraception." Items in bold were retained in the model ( $R^2 > 1\%$ ,  $p < 0.05$ ).

Reference category: Female – sexually active <1year

The two other Rasch-derived locations were then included in a multivariable model. The inclusion of these variables was not statistically significant.

### 6.3.3 Summary of adolescent attitudes towards contraception

Amongst the adolescents investigated within this study, support for contraception (both barrier and hormonal methods) was most common amongst females (versus males), older males (versus younger males), younger females (versus older females), sexually active males (versus sexually inactive males), sexually inactive females (versus sexually active females) and females who had only recently begun sexual activity (versus females who had been sexually active for at least a year). Amongst sexually active females, previous pregnancy history (i.e. never pregnant, pregnant–continuing or pregnant–terminating) was not associated with contraceptive attitude.

Amongst sexually active individuals, support for contraception was highest amongst participants who had used it previously (either at last sexual encounter or at any time in the past). Sexually active participants who had multiple sex partners in the previous year and those who had experienced an unwanted sexual encounter were less supportive of contraception. Early sexual debut and sexual activity under the influence of alcohol or other drugs was not associated with contraceptive attitude.

In attempting to quantify the relative contribution of possible correlates of contraceptive attitude; demographic factors, psychosocial factors and previous sexual behaviour (including RSB) were examined simultaneously. Previous use of contraception, less support for adolescent parenting, a lower number of sexual partners in the past 12 months, high self-esteem scores and a low total difficulties score on the Strengths and Difficulties Questionnaire (Goodman, 1999) all positively influenced contraceptive attitudes.

## CHAPTER 7

### *Discussion*

## 7.0 Overview

This final chapter summarises and integrates the research findings, placing them within the context of previous work. Limitations of the study are addressed, implications for current practice are discussed and recommendations for future research are made.

## 7.1 Development of three adolescent attitude scales

During this research project three psychometric scales were created. They dealt with important issues in adolescent sexual and reproductive health and were designed specifically for use with adolescents. The Rasch Unidimensional Measurement Model was applied to data collected from the “Teen Relationships Study” to establish the psychometric properties of the “Adolescent Attitudes towards Abortion (AAA) Scale,” “Adolescent Attitudes towards Adolescent Parenthood (AAP) Scale” and “Adolescent Attitudes towards Contraception (AAC) Scale.” Measurement properties for each of the scales were examined through use of the software program RUMM2030 (Andrich et al., 2008).

A reasonable degree of internal consistency (evidence of construct validity) and reliability was established for each scale. Scales were shown to be unidimensional and interval-level person locations (Rasch scores), indicating degree of support for each issue, were obtained for all participants. Reversed thresholds and DIF were accounted for so that the final scales provided invariant person measures. Establishing that the psychometric properties of each scale were robust meant that person measures could be used with confidence when examining the remaining research objectives. The ability of each scale to provide invariant measures for items and persons means that any changes in attitude, as determined in future applications of the scales, can be directly assessed. However, this would also require the scales to remain invariant over time (i.e. no evidence of DIF between occasions).

To further improve the psychometric properties of each scale, new items could be developed that would target individuals more precisely. For the AAA Scale, this would mean developing additional items that target the more extreme abortion attitudes (i.e. either very pro-life or very pro-choice). For the AAP and AAC Scales, this would mean additional items that appeal to individuals with the least amount of support for adolescent parenting and the greatest support for the use of contraception. However, considering that the most likely use of these latter scales would be to identify higher-risk adolescents who either support adolescent parenting or show less support for contraception (i.e. individuals

located at the lower end of each scale), not being able to differentiate very reliably between adolescents who most strongly disagree with adolescent parenting or most strongly support the use of contraception may not be a concern.

Finally, the AAP and AAC Scales each contained several items with closely aligned locations. To minimise the burden to participants, future versions of these scales could consider the removal of some of these items. Further Rasch analyses would be required to ensure the overall performance of an amended scale was not compromised.

## 7.2 Adolescent attitudes towards abortion

Abortion laws vary throughout Australia. However, nationwide, it is possible to access legal abortion services providing that certain medical and procedural requirements are met. Despite these restrictions, statistics indicate that Australians access abortion services more commonly than residents of other developed nations with similar or even more liberal laws (Sedgh et al., 2011). Furthermore, the Australian adolescent abortion rate is disproportionately high, in comparison to older age groups; raising the concern that young people who seek an abortion may be using it as a form of contraception (H. Williams & Davidson, 2004). Therefore, in the context of this study, a positive attitude towards abortion is only considered a health issue on the basis that adolescents may possibly use as a form of birth control.

Findings from this study indicate that adolescents' abortion attitudes are shaped within the context of their sexual and pregnancy history. Older female adolescents and sexually active adolescents demonstrated greater support for abortion; in addition to females who had previously undergone an abortion. These results suggest that younger females and sexually inactive participants may be less supportive of abortion because they dismissed their immediate risk of pregnancy. Support for abortion, amongst these individuals, may increase once sexual activity commences.

There was, as might be expected, congruence between abortion attitudes and previous pregnancy resolution; with a history of abortion shown to be highly correlated with abortion attitude. These findings reflect the notion that individuals strive to avoid cognitive dissonance (Hess & Rueb, 2005) and supports other findings that abortion has no adverse psycho-social impact on adolescents (Evans, 2005).

Taken as a whole, our findings support previous research which established attitudes towards abortion are influenced by an individual's ability to personalise and contextualise

the impact of a pregnancy (Skinner et al., 2009; J. Smith, S. R. Skinner, et al., 2011); with attitudes appearing to become more positive throughout adolescence and upon the commencement of sexual activity.

Amongst sexually active adolescents, we found that several risky sexual behaviours were associated with greater support for abortion: early sexual debut, non-use of the oral contraceptive pill (at last sex or ever), non-use of condoms (ever) and multiple sex partners in the past year. These factors were also highly correlated with abortion attitude when placed in linear regression models. Such findings have not been previously described. Adolescents who engage in risky sexual behaviours may do so as they have a diminished perception of pregnancy risk. This thought process has been described in previous qualitative research with Australian adolescent females who had terminated a pregnancy (Skinner et al., 2009). Whilst they reported a desire to postpone parenthood, they cited various reasons why they felt themselves unlikely to become pregnant. For some, having failed to become pregnant despite several unprotected sexual encounters fostered a sense of invincibility. For others, they interpreted the information they had received from medical professionals to indicate that they would struggle to become pregnant (Skinner et al., 2009). Overall, our findings support the contention that many at-risk adolescents view abortion more positively than their peers, and may therefore use it as a form of birth control.

Numerous studies have reported negative attitudes towards abortion amongst individuals citing a religious affiliation (J. W. Bryan & Freed, 1993; Ebaugh & Harney, 1985; Finlay, 1985; Granberg & Granberg, 1985; Himmelstein, 1986; Hollis & Morris, 1992; Lohan et al., 2010; Misra & Hohman, 2000; Notzer et al., 1984; Ray, 1984; Scott & Schuman, 1988; Stets & Leik, 1993; Wuthnow, 1988). Whilst our findings were in general agreement, we found that the predictive ability of religious affiliation was negligible in our sample of adolescents; <4% across all linear regressions conducted. Only two of the previously cited studies quantified the contribution of religious affiliation, reporting that religious affiliation contributed approximately 14% in regression models with American samples (Misra & Hohman, 2000; G. Wang & Buffalo, 2004). Whilst it can be difficult to make direct comparisons between studies with different samples and methods, the lesser influence of religion may reflect the secularisation that has been documented within Australia (Bellamy & Castle, 2004).

In our study, attitudes towards abortion were consistently, strongly and negatively associated with adolescent parenthood attitudes, meaning support for abortion was

associated with less support for adolescent parenting. This finding mirrors previous research. Prospective studies have tracked adolescent Attitudes towards Abortion before, during and after pregnancy. Amongst females, abortion attitudes have been positively associated with how adolescents either intend to (Brazzell & Acock, 1988) or actually resolve (Eisen et al., 1983; Frost & Oslak, 1998) a pregnancy. Female adolescents at high risk of early sexual onset, unintended conception and early motherhood, with positive attitudes towards abortion, were found to be significantly less likely to conceive over a 2-year period (Zabin, Astone, & Emerson, 1993). Amongst males, a systematic review (Lohan et al., 2010) found that adolescent males' intentions regarding abortion, throughout the course of an unplanned pregnancy, was significantly associated with their personal attitudes towards pregnancy occurrence and resolution. An Australian study with adolescent males determined that a high idealisation of parenting was the strongest predictor of choosing to continue a hypothetical pregnancy (Condon, Corkindale, Russell, & Quinlivan, 2006). Overall, these findings indicate that attitudes towards abortion and adolescent parenthood are closely aligned, with consequent influence on behavioural intentions and actual behaviour.

In summation, our findings indicate that abortion attitudes are shaped within the context of an individual's sexual and pregnancy history, and strongly influenced by their intention to avoid early parenting. Adolescents who engage in some risky sexual behaviours may have diminished perceptions of pregnancy risk. Consequently, adolescents who engage in these behaviours are often more supportive of abortion than their peers with safer sexual histories.

### **7.3 Adolescent attitudes towards adolescent parenthood**

Previous research has established a positive link between attitudes towards adolescent parenting and subsequent childbearing (Jaccard et al., 2003; Kalmuss et al., 2003; Zabin et al., 1990; Zabin et al., 1994). Whilst many adolescents in our study did not support adolescent parenting, permissive attitudes were evident within the sample.

In a direct comparison between genders, in our study, females exhibited a stronger desire to avoid pregnancy at the present time than males. This could reflect the greater personal impact a pregnancy would have on them. Males in our study were comparatively more supportive of adolescent parenthood than females. Similarly, previous research with Australian adolescents reported males had higher rates of idealisation towards pregnancy and parenthood in comparison to females (Condon et al., 2001b).



Of the broad range of variables examined in this study, few were associated with attitudes towards adolescent parenthood in males.

For females in our study, attitudes towards adolescent parenting were influenced by several factors. Older females, sexually active females and females who had been sexually active for at least a year all demonstrated greater support for adolescent parenting in comparison to younger females, sexually inactive females and females who had only recently commenced sexual activity. Our results are consistent with findings reported in the literature on romantic relationships, as adolescents in romantic relationships have previously demonstrated more supportive attitudes towards pregnancy (Jaccard et al., 2003). Similarly, interviews with childbearing adolescents identified that the feelings of love and security that came from being in relationship, fostered positive viewpoints on motherhood and reduced desire to avoid pregnancy (J. Smith, S. R. Skinner, et al., 2011).

For females in our study, adolescent parenting attitudes were also aligned with pregnancy history. Females who had previously given birth demonstrated the greatest support for adolescent parenting, followed by females who had terminated a pregnancy. Sexually active females who had never been pregnant were the least supportive of adolescent parenthood. In the literature, support for early parenting amongst adolescent parents has been previously reported amongst juvenile offenders (Kelly et al., 2008) and has even been detected amongst the younger female siblings of adolescent mothers (East, 1996). A report from the Guttmacher Institute, which reviewed the scientific literature in relation abortion and mental health, documented low levels of abortion regret amongst females who had undergone the procedure, regardless of how long ago the procedure was performed (Boonstra, Benson Gold, Richards, & Finer, 2006). This may explain why some adolescents who had previously terminated a pregnancy indicated support for adolescent parenting.

Amongst sexually active females in our sample, some risky sexual behaviours were associated with greater support for adolescent parenting. Similar to previous research, supportive attitudes were associated with sexual activity at an early age (Baumer & South, 2001) and the inconsistent or non-use of contraception (Brückner et al., 2004; Davies et al., 2004; Kalmuss et al., 2003; Kelly et al., 2008). For individuals who reported safer sexual behaviours, a firm desire to control one's reproductive history may have resulted in delayed sexual debut and a commitment to use contraception consistently. Themes related to taking control of one's reproductive history have been reported in previous qualitative studies with female adolescents (Skinner et al., 2009; J. Smith, S. R. Skinner, et al., 2011).

Conversely, sexually active females who reported being drunk or high at last sexual encounter were *more* likely to disagree with adolescent parenting. This finding contradicts the work of others who link substance abuse and risky behaviour (Kotchick et al., 2001). However, it is possible that our questionnaire item did not assess this risky behaviour adequately. The item specifically referred to intoxication during one's last sexual encounter and did not capture general behaviour. It should be noted that some adolescents have been known to alter their risk taking behaviours in the anticipation of a pregnancy (Quinlivan, 2004), meaning some females in the sample who desired pregnancy, may have specifically avoided alcohol.

Our study expanded upon previous research by examining adolescent attitudes towards early childbearing whilst accounting for numerous demographic, psychosocial and sexual behaviour variables; quantifying their relative contributions. Previous research in this area does not appear to have measured the influence of multiple correlates. Whilst Jaccard et al. (2003) determined that adolescents who expressed a desire to be pregnant were more likely to be African American or Latino, to be in a relationship, to have a mother with a low level of education and to live in a one-parent household; the relative importance of each factor was not investigated.

In our study, numerous associations were identified, and whilst some risky sexual behaviours were associated with support for adolescent childbearing, such behaviours had a negligible effect on attitudes when examined within the broader context of an adolescent's life. Later sexual debut, use of contraception at last sexual encounter and being drunk or high at last sexual encounter were all associated with less support for adolescent childbearing; but were marginalised by supportive abortion attitudes and a previous pregnancy when these variables were considered.

Responses to the two other Rasch-derived scales proved to be highly influential. When all potential predictors were considered simultaneously, females' attitudes towards contraception were the strongest predictors of attitudes towards adolescent pregnancy. Support for contraception was positively associated with reduced support for adolescent parenting.

Overall, the findings from this research indicate that, for females, attitudes towards adolescent parenting are shaped within the context of their respective sexual and pregnancy histories. Intentions to avoid early parenting were associated with support for

abortion and use of contraception. Positive or ambivalent attitudes towards adolescent parenting were associated with a greater risk of engaging in some risky sexual behaviours.

## 7.4 Adolescent attitudes towards contraception

Within this current study, females were more supportive of contraception than males, a finding that has been replicated in several previous studies (Holmbeck et al., 1994; Robertson et al., 2006; R. Wang et al., 2008; Zhou et al., 2012), and is not surprising when considering that females typically bear greater responsibility for an unexpected pregnancy. Previous qualitative research with young Australian males has also reported that males view contraception as the responsibility of the female (J. Smith, J. Fenwick, et al., 2011). Despite the general support for contraception shown by females, actual pregnancy history had no bearing on attitudes towards contraception. Sexually active females reporting a previous live birth or abortion held attitudes towards contraception that were similar to their peers who had never been pregnant.

Whilst males were, in general, less supportive of contraception compared to females, support was higher amongst older males. Sexually active males were also more supportive of contraception compared to their sexually inactive peers. These two results probably reflect the fact that older males were more likely to be sexually active and that sexually active males were more likely to consider the reality of a pregnancy. Whilst previous adolescent studies did not consider age differences, a survey of 300 American students aged 14-19 years also established that sexually active youth held more supportive attitudes about contraception (Holmbeck, et al., 1994). Similarly, a longitudinal study of 1,000 sexually active males determined that attitudes related to condom use became more favourable over time (Pleck, Sonenstein, & Leighton, 1993). These findings, taken together with our own, suggest that the commencement of sexual activity makes the issue of contraception more salient in the mind of an adolescent male, as personal risk of pregnancy increases. Previous studies investigating adolescent males' intentions to use condoms and contraception have focused on sexually active samples (Adler et al., 1990; Brown et al., 1992; A. Bryan et al., 2005; Crosby et al., 2004) and did not examine contraceptive attitudes or intentions prior to the commencement of sexual activity.

A disturbing finding was that, in stark contrast to males, older and sexually active females were less supportive of contraception than their younger and sexually inactive peers. When the duration of sexual activity was considered, support was lowest amongst the longer-term sexually active. This appears to be the first time that such a finding has been reported.

It is possible that these findings reflect diminishing support for contraception throughout the course of a romantic relationship.

Two possible factors may help explain this finding. Firstly, the measurement of contraceptive attitudes through the AAC Scale considered barrier and hormonal methods simultaneously; meaning any possible shift in support from one contraceptive method to another could not be delineated. Previous studies have reported a shift from barrier to hormonal contraceptives throughout the course of a relationship and in the context of casual versus regular partners in adolescent sexual relationships (Abbott, 1988; Crawford, Turtle, & Kippax, 1990; Kirkman, Rosenthal, & Smith, 1998; Lindsay, Smith, & Rosenthal, 1997; Moore, Rosenthal, & Mitchell, 1996; Rosenthal & Moore, 1991; A. M. A. Smith & Rosenthal, 1998; J. Smith, Fenwick, et al., 2012; R. L. Williams & Fortenberry, 2013; Wyn & Stewart, 1991). It is possible that the females who had been sexually active for at least a year reported less support for contraception because their attitudes towards condoms had diminished. Secondly, it is also possible that females who had been sexually active for at least a year were more likely to consider themselves to be in a loving and committed relationship. Previous qualitative research has reported that, for adolescents who had experienced an unplanned or unwanted pregnancy, relationship factors such as being in love and trusting their sexual partner surpassed the motivation or perceived need to use contraception (J. Smith, S. R. Skinner, et al., 2011).

Previous contraceptive use was strongly associated with support for contraception, and non-use or infrequent use was associated with less supportive attitudes. Use of condoms and contraception also proved to be strong correlates when examined in linear regressions. This consistency between attitudes and behaviour has been replicated in numerous adolescent studies across recent decades (Basen-Engquist & Parcel, 1992; Baumer & South, 2001; Brückner et al., 2004; A. Bryan et al., 2005; Hingson et al., 1990; Holmbeck et al., 1994; Kingree & Betz, 2003; Kingree et al., 2000; Lescano et al., 2006; Magura & Shapiro, 1994; Marsiglio, 1993; Reitman et al., 1996; Robertson et al., 2006; Sieving et al., 2007; Weisman et al., 1991; Zabin et al., 1993).

Amongst sexually active adolescents in our study, some risky sexual behaviours were associated with less support for contraception. Individuals reporting at least three sexual partners in the past twelve months were more likely to view contraception negatively. In previous work, multiple partnerships have been linked with unprotected intercourse and inconsistent use of condoms (Brückner et al., 2004; Moore & Rosenthal, 2006). Similarly, in our study, individuals reporting a previous unwanted sexual encounter were also more

likely to view contraception negatively. Unprotected sexual intercourse has been previously associated with sexual abuse in both adolescent males (Homma et al., 2012) and females (Silverman et al., 2001).

When examining all potential correlates simultaneously, there were several factors that remained significantly associated with contraceptive attitude, although most only accounted for a small percentage of variation in the model. A high total difficulty score on the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1999) was associated with less support for contraception and proved to be the strongest predictor of this attitude. As a high total difficulty score may suggest a mental health disorder (Goodman, Meltzer, & Bailey, 1998), it is possible this finding reflected underlying mental health issues.

Depression in adolescence has been consistently and independently associated with risky sexual behaviour (Waller et al., 2006; Wilson, Asbridge, Kisely, & Langille, 2010) and was found to be predictive of risky sexual behaviour in a nationally representative longitudinal study of American adolescents (Lehrer, Shrier, Gortmaker, & Buka, 2006).

Previous research has reported that high self-esteem was predictive of more positive attitudes towards contraception. In models used to predict contraceptive attitude, self-esteem contributed approximately 7% to model variation for the entire sample and for females separately (Holmbeck et al., 1994). Our study assessed self-esteem in the same way, through use of the Rosenberg Self-Esteem Scale (Rosenberg, 1989), and determined that self-esteem predicted up to 2.3% of model variation. Differences in the assessment of contraceptive attitudes make direct comparisons between the two studies difficult; however they both support the finding that self-esteem, in females especially, is important for the development of positive attitudes towards contraception.

In summation, our findings indicate that contraceptive attitudes are shaped by an individual's sexual history but not pregnancy history. When considering an extensive range of possible predictors, a high total difficulty score on the SDQ was strongly associated with a negative attitude towards contraception. A few other factors were associated with contraceptive attitude to a lesser degree. Individuals with positive contraceptive attitudes were more likely to report consistent use of condoms and contraception. Individuals with negative attitudes towards contraception were more likely to report multiple sex partners in the previous year and unwanted sexual activity.

## 7.5 Integration of research findings

This research revealed strong associations between attitudes and behaviours. Amongst sexually active females, positive abortion attitudes were most common amongst those who had previously had an abortion and positive early parenting attitudes were most common amongst those who had previously been pregnant. Amongst sexually active males and females, positive contraception attitudes were strongly associated with consistent contraceptive use.

Attitudes towards abortion and adolescent parenting each formed within the context of an individual's sexual and pregnancy history. Support for abortion and adolescent parenting was higher amongst sexually active individuals in comparison to their sexually inexperienced peers.

Whilst it appears contradictory that sexually active individuals were more likely to support abortion *and* adolescent parenting, it is probable these constructs were viewed as two separate issues by the adolescents in our sample. The sampling framework also captured a high proportion of sexually active females with divergent pregnancy experiences. The correlational analyses and multivariable regressions actually determined that support for abortion was associated with an intention to delay pregnancy until after adolescence (refer section 7.5.2).

Within our study, abortion attitudes were associated with sexual activity, but not years of sexual activity. For sexually active females, those who had been sexually active for longer showed the greatest support for adolescent parenting. These findings can be explained by the contention that abortion attitudes become more favourable once personal pregnancy risk increases (i.e. sexual activity begins) but aren't influenced by relationship factors that may form over time. In contrast, a commitment to avoid pregnancy and parenting may reduce once sexual activity begins and diminish further throughout the course of a sexual or romantic relationship.

Adolescent attitudes towards contraception also formed within the context of an individual's sexual history. However, unlike attitudes towards abortion and adolescent parenthood, contraceptive attitudes were not associated with pregnancy history for females. In males, whilst sexual activity was associated with positive contraceptive attitudes, attitudes were not linked to the number of years of sexual experience. In stark contrast, for females, sexual activity was associated with less support for contraception and this support was lowest amongst individuals with longer sexual histories.

### 7.5.1 Adolescent attitudes and risky sexual behaviour

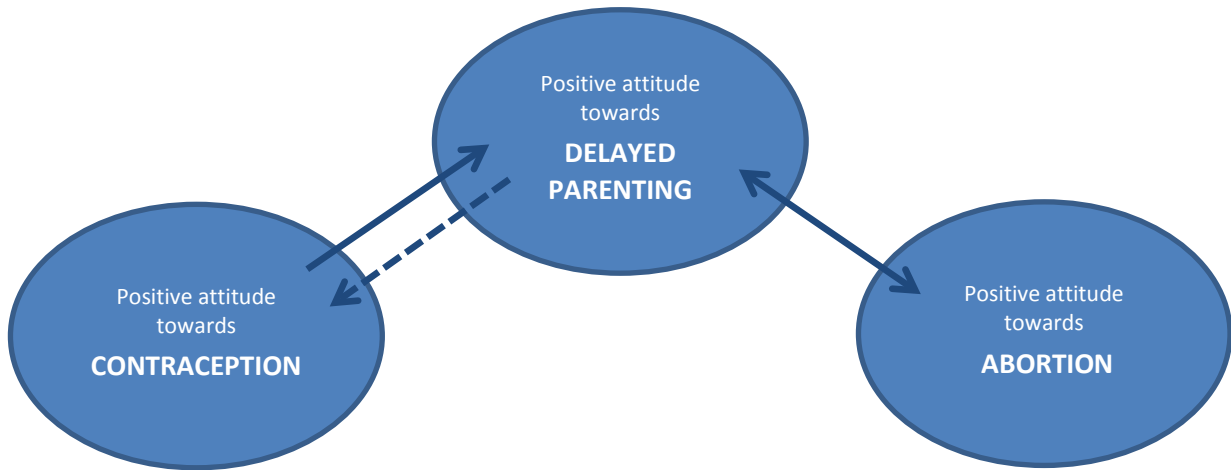
Amongst sexually active adolescents, attitudes towards abortion, adolescent parenthood and contraception were each associated with certain risky sexual behaviours. These links provide insight into the attitudes of adolescents who were most at risk of an unplanned pregnancy or STI. Sexual activity at an early age was linked to positive abortion attitudes and, for females, positive attitudes towards adolescent parenting. Infrequent or non-use of condoms and contraception was associated with support for abortion and negative attitudes towards contraception for both sexes. For females, inconsistent condom and contraceptive use was associated with support for adolescent parenting. Having multiple sexual partners in the previous twelve months was associated with support for abortion and negative attitudes towards contraception. An unwanted sexual encounter was associated with negative attitudes towards contraception.

In contrast, being drunk or high at last sexual encounter, whilst viewed as an undesirable behaviour by sexual health advocates, was associated with reduced support for adolescent parenting amongst females.

Whilst attitudes towards abortion, adolescent parenthood and contraception were linked with different risky sexual behaviours, when a broad range of possible explanatory factors were considered, these risky sexual behaviours proved to be poor correlates of each attitude. Instead, adolescents' attitudes in one domain proved to be highly predictive of their attitudes in other areas.

### 7.5.2 Relationship between attitudes

The relationship between the three attitude scales can be explained by examining the linear correlation between each scale and by considering the influence two scales had in the prediction of the third. Correlations were performed with the entire sample (i.e. sexually inactive and active males and females) and the multivariable linear regressions used sexually active females only. Therefore, the resultant model can only reasonably be applied to sexually active females. Figure 7.1 illustrates the overall relationship between each attitude.



**Figure 7.1. Flow chart illustrating relationship between adolescent attitudes towards contraception, adolescent parenthood and abortion for sexually active females**

*Note: The dotted line between delayed parenting and contraception indicates that attitudes towards delayed parenting were associated with contraception if only risky sexual behaviours were considered; and not if demographic, psychosocial or other behavioural factors were considered. The solid lines indicate that the relationship between attitudes remained secure, regardless of what potential correlates were considered.*

As indicated in Figure 7.1, and supported by the linear correlations (Appendix F), there was a weak but positive correlation between attitudes towards contraception and attitudes towards delaying parenthood until after adolescence (Appendix F;  $R=0.262$ ,  $p<0.001$ ). There was a weak but positive correlation between attitudes towards abortion and attitudes towards delayed parenting (Appendix F;  $R=0.219$ ,  $p<0.001$ ). There was no significant correlation between abortion attitudes and contraception attitudes (Appendix F;  $p=0.143$ ).

In the examination of factors associated with **contraception attitudes for sexually active females**, a total difficulties score on the SDQ was an important correlate; with other demographic, psychosocial and behavioural factors associated to a lesser degree. If only risky sexual behaviours were considered (i.e. demographic, psychosocial and other behavioural factors were ignored) support for delayed parenting (or less support for adolescent parenting) did predict support for contraception. Attitudes towards abortion were not associated with attitudes towards contraception.

In the examination of factors associated with **adolescent parenthood attitudes for sexually active females**, when all potential explanatory variables were considered, attitudes towards contraception had the greatest influence. Positive attitudes towards contraception were associated with support for delayed parenting (or less support for adolescent parenting). Positive attitudes towards abortion were also a significantly predictive and a positive influence on attitudes towards delaying parenthood.



In the examination of factors associated with **abortion attitudes for sexually active females**, most demographic, psychosocial and behavioural factors made minimal contributions. Support for delayed parenting (or less support for adolescent parenting) positively influenced abortion attitude. Attitudes towards contraception were not associated with attitudes towards abortion.

Overall, for sexually active females, attitudes towards abortion and early parenting were closely associated; meaning any effort to change either one of these attitudes may come with the added benefit of influencing the other. In contrast, contraceptive attitudes influence early parenting attitudes but the reciprocal relationship was weaker. Therefore, efforts to address attitudes towards contraception should focus specifically on this issue.

## 7.6 Study limitations

Like any research project, this study had several limitations. Notably, all data used in this research arose from a previously completed study and the original items for each of the attitude scales were developed and administered prior to any application of the Rasch paradigm. Whilst the Rasch paradigm and model could have been utilised in the initial development and trialling of items, it is not uncommon for it to be used in the improvement and/or assessment of existing scales. O'Connor (2004) provides several examples of how the Rasch Model has been subsequently applied to health outcome measures that were established by other theoretical approaches. However, application of Rasch paradigm principles at an earlier stage in scale development may have avoided the problems with some of the items which had to be deleted.

Following development of the three attitude scales, all statistical analyses were again restricted by the data that had already been collected. For example, one of the risky sexual behaviours examined was engaging in sexual activity whilst under the influence of alcohol or other drugs. This behaviour was assessed using a single question that related to most recent sexual activity only. The item did not determine the level of intoxication (if any) or if this was common behaviour. Similarly the incidence of unwanted sexual activity was also captured by one question, did not define what was meant by unwanted sex and did not distinguish between the different forms of abuse that may occur (e.g. unwanted touching, unwanted penetration). A broader behaviour criterion may have strengthened correlation between attitudes and behaviour (Eagly & Chaiken, 1993). It was only in retrospect, using data that had been already collected, that the limitations of the data became apparent.

All data in this research project were cross-sectional, meaning temporality could not be determined. Attitudes towards abortion, adolescent parenthood and contraception were significantly different across different reference groups (e.g. sexually active/not sexually active, sexually active-never pregnant/pregnancy-continuing/pregnancy-terminating, sexually active <1year/sexually active ≥1year). However, without longitudinal data, attitude formation and change over time could only be inferred from different groups within the cross-sectional sample.

Whilst the female sample included school students and those recruited from antenatal and pregnancy termination clinics, males were only recruited from schools. This meant there were fewer male participants who were sexually experienced or who had an experience of pregnancy. Similarly, the number of male cases that provided data on sexual activity duration data was also limited. Consequently, males could not be included in comprehensive multivariable linear regressions aiming to predict attitudes, as these regressions adjusted for sexual activity duration.

## 7.7 Implications for current practice

This research supports the contention that attitudes are important in shaping health behaviours. The development of positive contraceptive attitudes has been highlighted as an important intervention strategy. Positive contraception attitudes were strongly associated with contraceptive behaviour. This relationship is important because contraceptive behaviour is a strong predictor of pregnancy and STI risk (Kirby, 2007). Secondly, positive contraception attitudes were associated with positive attitudes towards delayed parenting. Attitudes towards contraception and adolescent parenting act as proximal factors, closely supporting positive sexual behaviour that will reduce the incidence of unplanned pregnancy and STI in adolescents (Kirby & Lepore, 2007). Positive contraceptive attitudes were also associated with a reduced number of sexual partners and not having experienced an unwanted sexual encounter. Multiple sex partners and unwanted sexual encounters have both been linked to unplanned pregnancy (Homma et al., 2012; Silverman et al., 2001) and contracting an STI (Choi et al., 1998; de Visser et al., 2003a; Ericksen & Trocki, 1992; Luster & Small, 1994; Skinner et al., 2007).

A better understanding of how contraceptive attitudes are formed, influenced and related to behaviour can strengthen the development of future sexual health interventions. For males and females, contraceptive attitudes are shaped by an individual's age and sexual history. In males, contraceptive attitudes may not strengthen until sexual activity

commences. However, comprehensive sexual health education from an early age will help ensure positive attitudes are in place prior to the commencement of sexual activity. Notably, pregnancy history in females is not associated with attitudes towards contraception. This has implications for health workers trying to encourage females who have previously been pregnant, regardless of the outcome, to consistently use contraception (J. Smith et al., 2013).

An important finding from this research was that female attitudes towards contraception may become less positive as they age, once sexual activity begins, or throughout the course of a sexual relationship. These findings reinforce the idea that as relationships progress, the primary objective is to avoid pregnancy rather than STIs (R. L. Williams & Fortenberry, 2013). Condom use may diminish due to feelings of reduced pleasure (Randolph, Pinkerton, Bogart, Cecil, & Abramson, 2007), their association with STIs (Mantell, Hoffman, Exner, Stein, & Atkins, 2003), and in the context of being in love and trusting their partner (J. Smith, S. R. Skinner, et al., 2011). Condoms only become relevant if the relationship is casual (Kirkman et al., 1998; J. Smith, Fenwick, et al., 2012), or if hormonal methods are not used (J. Smith, Fenwick, et al., 2012). Therefore, effective programs should strive to encourage dual methods of protection, using condoms and hormonal methods simultaneously. These programs should also educate adolescents on how to best protect themselves in mutually monogamous relationships if they wish to stop using condoms. This would involve undergoing STI testing prior to discontinuing condoms, regularly undergoing STI testing and making an agreement to use condoms with any extra-relationship partners (R. L. Williams & Fortenberry, 2013). Some adolescents also discontinue or avoid hormonal contraception due to real and perceived side-effects (Skinner et al., 2009) and this should be addressed in health interventions.

To a lesser extent, although still important, this research supports the notion of gauging attitudes towards abortion and adolescent parenthood. Both abortion attitudes and adolescent parenthood attitudes are shaped by an individual's ability to personalise and contextualise a pregnancy. For females, the commencement of sexual activity may reduce commitment to remain child-free. There are also some adolescents who consciously or unconsciously seek to be teenage parents (Condon et al., 2001b; Quinlivan, 2004; J. Smith, Skinner, et al., 2012). Programs need to address these issues by increasing the capacity of adolescents to control their pregnancy history and should provide greater academic support and vocational outcomes to improve future perspectives (J. Smith, Skinner, et al., 2012). This will help females to develop aspirations other than motherhood. Examples of

some current programs that operate in Australia include “Youth Connections” (Australian Government, Department of Education, 2013) and various mentoring programs for Indigenous youth (Ware, 2013).

Positive attitudes towards abortion and adolescent parenthood attitudes may also indicate risky sexual behaviour such as early commencement of sexual activity and non-use or infrequent use of condoms or contraception. Positive abortion attitudes may also be associated with multiple sex partners. Being aware of such associations could assist in the delivery of targeted interventions that seek to minimise specific risky sexual behaviours.

Within Australia, all school-based sexual health curricula address the importance of developing positive attitudes towards a range of issues and contain numerous values clarification activities (Government of Western Australia, 2002a; Ollis & Mitchell, 2001; SHine SA, 2011; State Government of Victoria, 2004). This aligns with international guidelines on sexuality education (United Nations Educational, 2009) and compares with successful overseas curriculum such as the “Long Live Love” program in The Netherlands (Ferguson, Vanwesenbeeck, & Knijn, 2008).

Despite access to good quality curricula, educators have reported that current programs are only somewhat effective in helping students to explain and clarify their attitudes (A. M. A. Smith et al., 2011). A consultation with Western Australian youth reported their frustration with school based education that focused only on “...*puberty, procreation and penetration*” (Sorenson & Brown, 2007, p. 34). Recommendations called for small, well-facilitated classes that enabled discussion and exploration of issues (Sorenson & Brown, 2007). Parents have also expressed a desire for sexual health education that is sensitive to the diversity of student and family values (Dyson, 2010). With these issues in mind, it is important to note that the recently introduced national curriculum for Health and Physical Education (Australian Curriculum, 2014) provides little information regarding specific health issues, marginalises the importance of attitudes in the domain of sexuality education and does not specifically identify areas where positive attitude formation is warranted.

The findings from this research advocate for the use of a curriculum that specifically targets adolescent attitudes towards contraception, early parenting and abortion; and for organisational changes that will improve the capacity of educators to effectively deliver this curriculum. Positive attitudes towards contraception and delayed parenting should be encouraged. Whilst we do not advocate attempts to change abortion attitudes in a classroom environment, there is the potential that strong support for abortion may reflect

the view that terminations are an acceptable form of birth control, and likewise, that strong opposition to abortion may reflect a desire to be pregnant. Educators should therefore be aware of these possibilities. Respectful conversation about attitudes towards contraception, early parenting and abortion should be encouraged within a classroom environment.

Efforts within Western Australia would also be strengthened by extending current sexuality education beyond year 10 level. As an example, the “Crossroads” program in New South Wales provides a minimum of 25 hours of compulsory education in the areas of *relationships* and *drugs* to year 11 and 12 students (New South Wales, 1999). All students participate, regardless of what other units they may be studying. The specific content and amount of time devoted to each focus area is determined by the individual school according to what will best meet student needs. Outside of the classroom, the education of senior students may be further enhanced through access to community-based programs (Australian Medical Association, 2011; Youth Affairs Council of Western Australia, 2013).

It is encouraging to note that the Western Australian Health Department has recently funded pre-service and in-service sexuality and relationships education training for both primary and secondary school teachers throughout the state (S. Burns, personal communication, January 27, 2014). To commence in 2014, it is hoped that this program will increase teacher confidence, raise awareness of resources and improve the capacity of educators to address complex areas such as attitude formation and assessment.

Finally, administration of the “Adolescent Attitudes towards Abortion,” “Adolescent Attitudes towards Adolescent Parenthood” and “Adolescent Attitudes towards Contraception” Scales can support the work of educators, sexual health professionals and researchers with an interest in adolescent sexual health. Each scale has sound psychometric properties, singularly measures the construct of interest and provides interval scores that are invariant in nature. Repeated use of these scales can provide quantifiable evidence of attitude change over time.

## 7.8 Recommendations for future research

Based on the findings of this research and identified shortfalls in the study design, several recommendations for future investigation are made.

Principally, longitudinal investigations of attitudes would enable the cause and effect relationships that have been hypothesised in this study to be verified. Attitudes towards

abortion, adolescent parenthood and contraception could be tracked regularly, as participants commenced and progressed through romantic and sexual relationships. This would enable researchers to definitively determine how male and female attitudes change over time, and how they are influenced by factors such as age, becoming sexually active, being pregnant/causing a pregnancy and pregnancy resolution. For example, older females and sexually active participants were more supportive of abortion. Longitudinal research could determine if this was because such individuals perceived a greater personal risk of pregnancy at the time of survey completion, or if there were other mediating factors. Longitudinal research could also determine if attitudes towards abortion, adolescent parenting and contraception formed prior to engaging in certain risky sexual behaviours.

To further improve the level of statistical analyses that could be undertaken, the study design would need to capture a greater number of males, sexually active males with different sexual activity durations (i.e. <1 year and  $\geq 1$  year) and males who had been the partner in a pregnancy. These data would enable multivariable linear regressions to be conducted for both genders. It would also help to determine if male attitudes towards abortion, adolescent parenthood and contraception were influenced by pregnancy history; an investigation that was outside the capability of this current project.

Investigation of adolescent pregnancy attitudes amongst males failed to determine any predictive factors. This is most likely a reflection of the male sample which was predominantly sexually inactive, and suggests that a large proportion of males do not give adolescent parenthood any in-depth thought (Albert, 2007). Most Australian research on adolescent males' attitudes towards early parenting considered only hypothetical pregnancies and data on sexual activity or pregnancy history were not collected (Condon et al., 2006; Condon et al., 2001b; Corkindale, Condon, Russell, & Quinlivan, 2009). An Australian study that did use young sexually active males reported on their desire to avoid pregnancy whilst their contraceptive behaviour remained inconsistent (J. Smith, J. Fenwick, et al., 2011). A systematic review of studies undertaken in western developed countries determined that social class, ethnicity, gender identity, religiosity, subjective norms, and idealisation of pregnancy and parenthood all influenced male attitudes towards pregnancy and pregnancy resolution (Lohan et al., 2010). Clearly additional research with Australian male adolescents is warranted, to help determine how adolescent male attitudes towards early parenting are formed.

Future studies should include sexually active males with and without an experience of pregnancy, and both longitudinal and qualitative analyses would provide greater insight the

factors that shape male attitudes towards adolescent pregnancy. For a longitudinal study, a school sample would be the easiest way to collect male data. However, as it would be unacceptable to ask about sexual activity prior to administering any questionnaire, oversampling would be required to gather enough sexually active males. A recent study determined that 22.3% of year 10 males, 35.8% of year 11 males and 52.1% of year 12 males in Australia had engaged in sexual intercourse (Mitchell et al., 2014). Other possibilities for male recruitment include vocational institutions (e.g. technical colleges) and sporting clubs. Adolescent males with an experience of pregnancy could be approached through the female partner who was attending an antenatal service.

This research suggests that for any sexual health intervention seeking to influence safe sex behaviour through attitudes, contraceptive attitudes should be a key focus. Previous research has identified a few factors that influence the formation of positive contraceptive attitudes in adolescents (Adler et al., 1990; Holmbeck et al., 1994; R. Wang et al., 2004) and like Holmbeck et al. (1994), this study also determined that high self-esteem was positively correlated with attitudes towards contraception. A strong association between the total difficulties score of the Strengths and Difficulties Questionnaire (Goodman, 1999) and contraceptive attitudes was also found. Due to the importance of contraceptive attitudes, further research is required to broaden our understanding of what will help to shape positive contraceptive viewpoints in adolescents. Well-developed educational interventions, that incorporate these findings, could be developed and evaluated for use with adolescents.

Much work is needed to further understand the reasons why Australians utilise abortion services at disproportionately high levels. Other developed nations, where access to abortion is decriminalised or is much easier than the current Australian system, report much lower abortion rates amongst all their citizens, regardless of age (Sedgh et al., 2011). Within Australia, the youngest age groups access abortion services at a higher rate than the national average (H. Williams & Davidson, 2004).; and Australian adolescents also access abortion services more readily than their international peers based in other developed countries (United Nations Children's Fund, 2001; van der Klis et al., 2002).

Focused research into risky sexual behaviours and the factors that influence their occurrence is also warranted. More work is needed to better understand adolescents who are at risk for pregnancy and contracting an STI. Whilst this research uncovered numerous associations between attitudes towards abortion, adolescent parenthood and contraception, with various risky sexual behaviours; the strength of this association was

negligible when a broad range of individual, familial and extrafamilial factors were considered. Longitudinal and qualitative research may provide more insight. For example, they could help to explain why individuals who had had sexual intercourse with multiple partners in the past year, or who had experienced unwanted sexual activity, were statistically more likely to hold negative contraceptive attitudes. Longitudinal analyses may uncover the direction of causality and qualitative research would provide in-depth personal perspectives to uncover meanings.

Further work in relation to risky sexual behaviour should clearly define its scope and measure the behaviour criterion broadly. Applying models of aggregation and compatibility will improve correlations between general attitudes and behaviour (Eagly & Chaiken, 1993). Aggregation requires that the behaviour criterion is broad (e.g. “consistent use of condoms” is more desirable than “used condoms at last sexual encounter”) and compatibility requires that the same action, context and time elements are used in relation to both the attitude and the behaviour (Ajzen & Fishbein, 2005).

Whilst the “Adolescent Attitudes towards Contraception Scale” displayed strong psychometric properties, perhaps greater information could be gathered if future versions of the scale measured attitudes towards condoms and contraception separately. Contraceptive methods change throughout the course of an adolescent relationship, with many adolescents reporting a preference for hormonal contraceptives in longer term relationships (H. Williams et al., 2013). If future versions of the scale viewed each method as a sub-scale, any change in attitudes between methods could be delineated.

## 7.9 Conclusion

Comprehensive and systematic reviews of interventions seeking to reduce the incidence of STI and pregnancy amongst adolescents have repeatedly identified the importance of attitudes (Buhi & Goodson, 2007; IPPF European Network, 2006; Kirby & Lepore, 2007). Theoretical perspectives of health behaviour have linked personal attitudes to behaviour change (Deptula et al., 2006) and changing personal attitudes has been identified as one of the easiest issues to address in relation to pregnancy and STI prevention (Kirby, 2007; Kirby & Lepore, 2007). This brings into focus the need for the precise measurement of attitudes and further investigation into attitude formation.

Application of the Rasch Unidimensional Measurement Model provided insight into the three attitude scales created by this research; providing unidimensional, invariant and



interval-level data. Researchers and educators should be encouraged and supported to use this technique when attempting to measure attitudes, and for any psychometric purpose within the domain of sexual health. The RUMM2030 program (Andrich et al., 2008) provided strong visual evidence of how closely actual data conformed to that expected by the model and identified anomalies. This led to a greater understanding of the various constructs.

Whilst adolescents, as a group, are disproportionately affected by the negative outcomes of early pregnancy and STIs, sexual attitude research is more likely to be investigated with older samples such as university students. This study was unique in that it described sexual attitudes in a rarely studied age group. In overcoming challenges associated with ethics approval, consent and recruitment, this sample provided valuable insight into adolescent attitudes towards abortion, adolescent parenthood and contraception; with an urban Western Australian focus. The sample included males and females, sexually active and inactive participants, and females with a range of pregnancy histories and pregnancy resolutions. The sample breadth meant attitudinal data were collected from both a representative sample and a high-risk sample of adolescents.

Adolescent attitudes towards abortion, adolescent parenthood and contraception were affected to varying degrees by sexual and pregnancy history. These attitudes were also interconnected. For sexually active females, positive contraceptive attitudes were identified as paramount to pregnancy and STI prevention, due to their association with good contraceptive behaviour and reduced support for adolescent parenting. Less support for adolescent parenting and support for abortion were positively and strongly associated. Less support for adolescent parenting positively influenced contraceptive attitudes to a lesser degree. Amongst sexually active adolescents, support for abortion, adolescent parenthood and the non-use of contraception were associated with various risky sexual behaviours.

It is hoped that the findings of this study will support and further encourage efforts for sexual health education and intervention programs to embrace a comprehensive approach, and one that fosters positive sexual attitudes. Research findings may also help inform the work of clinical practitioners, providing insight into the attitudes of high-risk adolescents.

Regardless of the application, this doctoral research has increased understanding of Western Australian adolescents' attitudes towards abortion, adolescent parenting and contraception; the factors associated with such attitudes, their relationship to each other and the relationship between attitudes and risky sexual behaviour.

Attitude is a little thing that makes a big difference. ~ Winston Churchill

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## APPENDICES

## APPENDIX A

### *The “Teen Relationships Study” – Attitude and Intention items*

- Items were answered on a four-point Likert scale consisting of *strongly disagree*, *disagree*, *agree* and *strongly agree*.
- Items preceded by an L were asked of both males and females, G items were only given to girls and B items to boys.

Original list of abortion items (n=10)		
L	3	I would have an abortion if there was something wrong with the baby
L	10	I don't believe in abortion
L	17	Abortion is a good option if you need to use it
L	31	I don't think abortion should be available
L	39	My family does not agree with abortion
G	2	I would have an abortion if I wasn't ready to have a baby
G	5	I would have an abortion if I was raped and became pregnant
G	23	I would have an abortion if I didn't have a partner to support me
B	2	I would want my partner to have an abortion if I wasn't ready to have a baby
B	5	It is okay for a girl to have an abortion if she was raped and became pregnant

Original list of adolescent parenthood items (n=19)		
L	9	You would be closer to your child if you had them young (under 20)
L	14	I want a career before I have a baby
L	18	I wouldn't fit in with my group of friends if I had a baby now
L	23	Having a baby will help me grow up
L	28	There are certain things (i.e. partner, house, money) you need before you should have kids
L	35	When you're young you have more energy to look after a child
L	36	I'd lose my friends if I had a baby right now
L	42	Having a baby would be good for my relationship
L	45	There are lots of things I want to do before I have kids
G	1	Getting pregnant would be my worst nightmare
G	3	Having a baby now would change my life in a good way
G	6	I wouldn't really mind if I fell pregnant now
G	10	I would rather become a mum before I turn 20
G	17	It would be easier to cope becoming a mum before I turn 20
B	1	Getting a girl pregnant would be my worst nightmare
B	3	Becoming a dad now would change my life in a good way
B	6	I wouldn't really mind if I got a girl pregnant now
B	10	I would rather become a dad before I turn 20
B	17	It would be easier to cope becoming a dad before I turn 20

Original list of contraception items (n=53)			
L	2	*	Condoms are a guy's thing, they're the ones that have to use them
L	4		Contraception is too expensive (condoms/pill/Implanon)
L	5	*	I don't see the point in using contraception because it doesn't always work (condoms/pill/Implanon)
L	6	*	I don't trust condoms, they can break
L	8	*	I can talk to my parents/guardian about sex
L	12	*	Girls should take responsibility if they don't want to get pregnant
L	15	*	I worry about what people will think if I buy condoms
L	16	*	Condoms are a hassle
L	21		If you're drunk using a condom is the last thing that's on your mind
L	22		If you've both been tested, condoms aren't such a big deal
L	25		I don't think contraception's such a big deal when you've been with someone for a long time
L	27	*	Contraception is a joint thing, girls should be on the pill and guys should use condoms
L	29		Condoms interrupt the moment
L	30		Sex just seems to happen when you're drunk
L	32	*	Sex is something you should share with someone you really care for
L	34	*	My parents/other family members would help me to access contraception
L	37	*	I'd rather be in a relationship than just have sex with anyone
L	38	*	It's not really a girl's choice, it's up to boys if they want to use condoms
L	40	*	Sex should be an expression of love
L	41	*	It's embarrassing buying condoms from the chemist/supermarket
L	43	*	There's no need to use condoms when you're in love with someone
L	47	*	You shouldn't have sex until you're in a relationship
L	48	*	To start off with condoms are pretty much essential until you get comfortable with someone
L	49	*	When you're drinking you feel like having sex more
L	50		You don't really think about using condoms when you're drinking
L	51	*	I feel like people judge me when I get contraception (condoms/pill/Implanon)
L	52	*	Sex is better without condoms
L	53		I don't even think about condoms in the heat of the moment
L	54	*	Sometimes I just can't be bothered using condoms
G	4	*	If you are on the pill/Implanon I don't think you need to use condoms
G	7	*	I can talk to my parents / guardian about boys
G	8	*	I'm too scared to ask guys to use a condom
G	9	*	I think it would be hard for me to fall pregnant
G	11	*	I'm more worried about catching a disease than falling pregnant
G	12	*	Falling pregnant accidentally won't happen to me
G	13	*	It's hard to talk to boys about contraception
G	14	*	The pill/Implanon should be used as a precaution in case the condom breaks
G	15	*	My parents just lecture me when I bring up stuff about boys and sex
G	18	*	It's embarrassing to ask your doctor about contraception (pill/Implanon/other)
G	19	*	I don't think I can fall pregnant
G	21	*	I would stop using the pill/Implanon if I started to put on weight
G	24	*	I'm too scared to ask my parents if I can go on the pill/Implanon/other
G	27		It's too hard to remember to take the pill every day
G	29	*	I wouldn't go on the pill/Implanon because there's too many side-effects
B	4	*	If the girl is on the pill /Implanon I don't think you need to use condoms
B	7	*	I can talk to my parents/guardian about girls
B	8	*	I'm too scared to talk about condoms with my partner
B	9		I think it would be hard for me to get a girl pregnant
B	11	*	I'm more worried about catching a disease than getting a girl pregnant
B	12	*	Getting a girl pregnant accidentally won't happen to me
B	13		It's hard to talk to girls about contraception
B	14	*	Girls should use the pill/Implanon as a precaution in case the condom breaks
B	15		My parents just lecture me when I bring up stuff about girls and sex



Additional items not analysed as part of this doctoral research		
L	1	Being in a relationship makes you feel special
L	7	I can't fall in love at my age
L	11	I'd rather be in a relationship than be single
L	13	I see myself as older than I am
L	19	I'm not ready for a serious relationship
L	20	I don't want to hear about sex from my teachers
L	24	It would be easier to ask questions in sex ed if boys and girls were separated
L	26	You feel loved and wanted when you are in a relationship
L	33	Sex ed should start earlier than it does
L	44	In sex ed we're not taught the stuff we really need to know
L	46	They need to use young people that we can relate to in sex ed
G	16	I prefer to go out with older boys
G	20	Girls are too bitchy for me
G	22	I get along better with boys
G	25	Most of my friends are boys
G	26	I'm more mature than girls my age
G	28	Most of my friends are older
G	30	People my age are immature
G	31	The first time I had sex was because I trusted the guy I slept with
G	32	The first time I had sex was because I wanted to keep him happy
G	33	The first time I had sex was because it was the right time and right person
G	34	The first time I had sex was because I wanted to see what the big deal was
G	35	The first time I had sex was because he wanted to
G	36	The first time I had sex was because I was in love with him
G	37	The first time I had sex was because I wanted to fit in
G	38	The first time I had sex was because I wanted know what it felt like
G	39	The first time I had sex was because I felt comfortable with him
G	40	The first time I had sex was because I wanted to feel a bit more grown up
G	41	The first time I had sex was because everyone else was doing it
B	16	I prefer to go out with girls younger than me

\* These items were entered into RUMM2030 but were immediately discarded as extreme. Items are immediately discarded by the program if the total score for respondents were either all zero or all perfect scores (i.e. everyone either strongly agreed or strongly disagreed)(RUMM Laboratory, 2004). As the item does not discriminate participants, it does not fit the Rasch Unidimensional Measurement Model.

## APPENDIX B

*Peer—reviewed journal article detailing development of the  
“Adolescent Attitudes towards Abortion Scale”*



# Scale construction utilising the Rasch unidimensional measurement model: A measurement of adolescent attitudes towards abortion

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## RESEARCH

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## Abstract

### Background

Measurement scales seeking to quantify latent traits like attitudes, are often developed using traditional psychometric approaches. Application of the Rasch unidimensional measurement model may complement or replace these techniques, as the model can be used to construct scales and check their psychometric properties. If data fit the model, then a scale with invariant measurement properties, including interval-level scores, will have been developed.

### Aims

This paper highlights the unique properties of the Rasch model. Items developed to measure adolescent attitudes towards abortion are used to exemplify the process.

### Method

Ten attitude and intention items relating to abortion were answered by 406 adolescents aged 12 to 19 years, as part of the "Teen Relationships Study". The sampling framework captured a range of sexual and pregnancy experiences. Items were assessed for fit to the Rasch model including checks for Differential Item Functioning (DIF) by gender, sexual experience or pregnancy experience.

## Results

Rasch analysis of the original dataset initially demonstrated that some items did not fit the model. Rescoring of one item (B5) and removal of another (L31) resulted in fit, as shown by a non-significant item-trait interaction total chi-square and a mean log residual fit statistic for items of -0.05 (SD=1.43). No DIF existed for the revised scale. However, items did not distinguish as well amongst persons with the most intense attitudes as they did for other persons. A person separation index of 0.82 indicated good reliability.

## Conclusion

Application of the Rasch model produced a valid and reliable scale measuring adolescent attitudes towards abortion, with stable measurement properties. The Rasch process provided an extensive range of diagnostic information concerning item and person fit, enabling changes to be made to scale items. This example shows the value of the Rasch model in developing scales for both social science and health disciplines.

## Key Words

Rasch unidimensional measurement model, adolescent, abortion, attitudes, attitude scale

## What this study adds:

1. Whilst many recent studies have utilised the Rasch unidimensional measurement model, this research is a unique opportunity to apply the technique to attitudinal data in the domain of adolescent sexual health.
2. Provision of a valid and reliable unidimensional scale to measure adolescent attitudes towards abortion with invariant, interval-level scores.
3. Accurate assessment of attitude scores will greatly benefit the development and administration of sexual health interventions for adolescents.

## Background

Social science researchers often utilise questionnaires or scales to measure latent traits such as quality of life, anxiety



levels or maths ability. Such scales consist of a collection of questions or items, where item responses are scored and summed to yield a final scale score.

Scale scores can be ranked according to the level of measurement.<sup>1</sup> Traditionally, social research will generate nominal or ordinal scores, which are considered less precise measures than the interval and ratio scores used by the physical sciences. Scores will also be influenced by the sample used to construct the scale, the subsequent population/s to whom the scale is administered, and the items or persons that are used when making comparisons.<sup>2</sup> Recently these traditional approaches have been complemented, and in some instances replaced, by application of the Rasch unidimensional measurement model.<sup>3-6</sup>

The Rasch unidimensional measurement model,<sup>7</sup> a robust model for the objective measurement of latent traits, addresses weaknesses in traditional approaches because it is based on principles of fundamental measurement – the only measurement model in the social sciences to do so. For this reason it was chosen as the model for this study; to establish the measurement properties of a scale assessing adolescent attitudes towards abortion.

When fundamental measurement occurs, invariant comparisons of items and persons can be made in terms of a constant unit.<sup>8</sup> Fundamental measurement is taken for granted in the physical sciences, whereas social scientists have been cautioned against treating raw scores and the summation of such scores as measures of a construct without first checking they conform to these fundamental principles.<sup>9,10</sup> Raw scores for both items and persons are transformed into measures (known as locations) using a logistic mathematical function derived by the Danish mathematician Georg Rasch.<sup>7</sup>

### Comparison of different techniques

The measurement paradigm on which the Rasch model is based differs from alternative theoretical paradigms that researchers may use to construct and scale scores. The advantages of the Rasch model over traditional psychometric methods has been stated previously.<sup>11,12</sup>

Most commonly, researchers will apply the Classical Test Theory (CTT) approach, whereby the strength of the attribute (or ability) is defined by an observed score, derived through summation of a true score and a measurement error term.<sup>13</sup> Alternatively, Item Response Theory (IRT) may be applied, whereby trait levels (or the probability of a correct response) are calculated as a

mathematical function of person and item parameters.<sup>14</sup>

The Rasch model also uses person and item parameters to determine the probability of an item score. However, whilst IRT models seek to fit the response model to the data, the Rasch model operates in the reverse direction by requiring the data to fit the model. Application of the Rasch model to a set of data produces a range of diagnostic information which may be used to determine how well items work to measure traits.<sup>13,15</sup>

In essence, Rasch analysis is a statistical technique that enables questionnaires or scales to be modified, with items rescored or removed, so that the instrument better measures the trait, attitude or ability under consideration. This is in contrast to trying to change the model of the trait, attitude or ability to fit the data based on the original questionnaire.

The Rasch model is used to help establish the internal consistency and reliability of a set of items. Estimates of person locations are independent of which items are used for comparisons. Likewise, estimates of item locations are independent of which persons are used for comparisons. The model also requires invariance in the unit of measurement, and it is the production of these constant units of measurement that result in equal-interval scale scores for persons. These scores (locations) can then be used in standard statistical analyses.

The Rasch model uses fit statistics and graphical inspection to indicate whether a set of items can be considered to comprise a unidimensional measurement scale with equal-interval level properties, and whether scale scores remain invariant across different groups. Invariance is the core measurement principle on which the model rests, with the analysis seeking to identify anomalies in the data which may undermine such invariance of measurement. Anomalies can lead to a better understanding of the property being measured and the task is to work towards a better fit of data to the model's requirements, until the match is sufficient to provide invariant measures.<sup>9</sup> This may be achieved by the deletion or modification of items, the development of new items; and in some instances the deletion of specific persons or the measurement of further groups of persons.

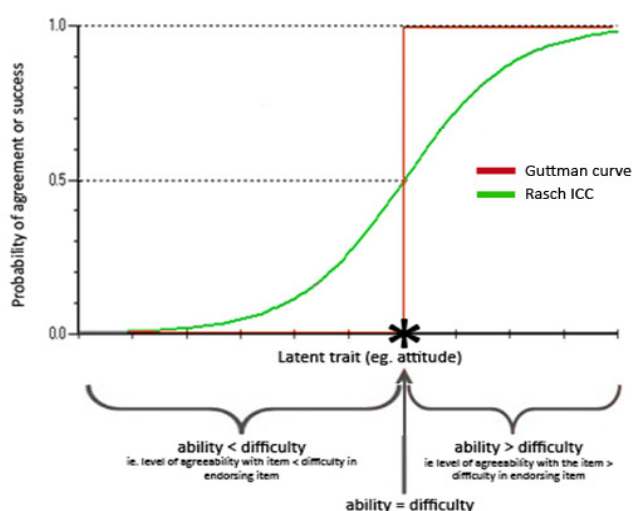
### The Rasch unidimensional measurement model

The Rasch model is essentially a probabilistic version of the Guttman scale.<sup>16</sup> Figure 1 illustrates the response structure of an item according to both models. The red line in Figure 1 illustrates the ideal Guttman pattern. The Guttman scale

assumes that if a person has an ability equal to (the position \* on the x axis) or greater than the difficulty of the test item, the probability of getting an affirmative response is 100%. Those having ability less than the difficulty of the item have 0% probability.

In contrast, according to the Rasch model (illustrated by the green curve in Figure 1) if the difficulty of the item and the ability of the respondent are equal (at \*) the person has only a 50% probability of responding affirmatively. There is a gradient of probability on both sides; falling as ability decreases and increasing as ability increases. The green curve in Figure 1 is termed an Item Characteristic Curve (ICC).

**Figure 1: The response structure of a single dichotomous (yes/no) item under Guttman and Rasch principles**



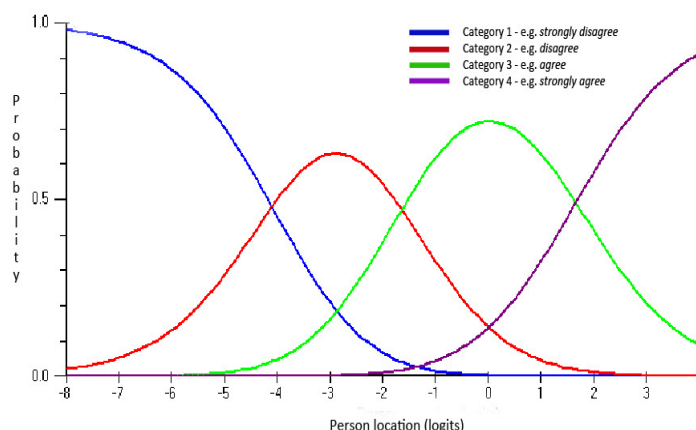
When the Rasch model is applied to ordered response data, like attitudes, where successively higher scores indicate increasing levels of agreement with a particular statement or item, person ability represents how strongly respondents support the attitude item and item difficulty represents how easy the item is to endorse.

Ordered response data also introduces the probability of a response being made in any one response category (e.g. the probability of selecting *strongly agree*, *agree*, *disagree* or *strongly disagree*). In this instance, in addition to the ICC, a Category Characteristic Curve (CCC) is produced for each item. The CCC displays the probability of a person endorsing a particular response category based on their level of support for the item and the intensity or difficulty of the item.

Figure 2 illustrates a CCC with well-spaced response categories. The range of person total scores, termed person locations in Rasch analysis, is plotted along the x-axis. More

detail about the unit of measurement (i.e. logits) will be forthcoming. The probability of selecting each category is plotted along the y-axis. In Figure 2, the probability of selecting *disagree*, across different person locations, is shown by the red curve.

**Figure 2: Category Characteristic Curve (CCC) for an item where the response categories are operating well**



The point between two adjacent categories, where either response is equally probable, is termed the threshold. For data to adhere to the Rasch model, threshold points should be correctly ordered, such that respondents would consider endorsing *strongly agree* to represent greater support for the latent trait than selection of the *agree* category. It would also mean that respondents with high overall levels of the latent trait being measured would consistently endorse the higher-scoring responses and respondents who possessed lower trait levels would consistently endorse the lower-scoring responses.

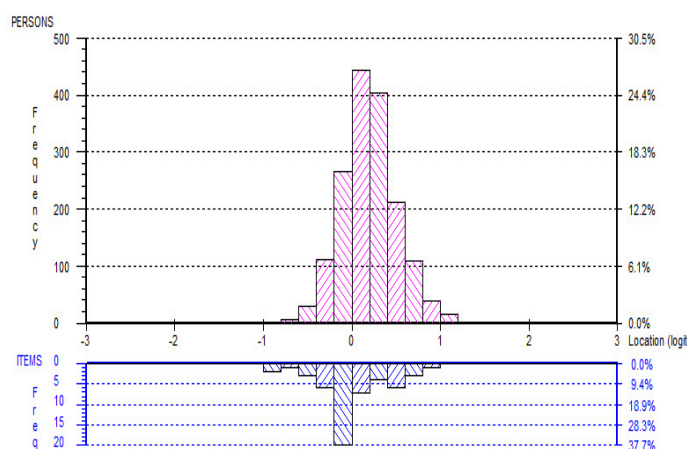
Disordered thresholds occur when participants have difficulty consistently discriminating between response categories. This may arise if there are too many response options or if the labelling is confusing.<sup>3</sup>

Person and item locations are logarithmically transformed and plotted on the same continuum using a common unit of measurement termed a *logit*; thereby converting ordinal data to equal-interval data. Figure 3 illustrates how person and item locations (measured in logits) can be plotted on the same continuum along the x axis. In Rasch modelling, these logit values are termed locations instead of scores.

A *person's location* in logits is their natural log odds for agreeing to a set of items. People with higher levels of the attitude under consideration have more positive endorsement of items and thus have locations (in logits) that occur to the right of the scale.

An *item's location* may be interpreted as the relative difficulty respondents, as a whole, have in responding affirmatively to that item. Items located to the right of the continuum midpoint of 0 logits (i.e. a positive logit value) are more difficult to endorse than those to the left (a negative logit value), with the item content helping to define what more or less of the construct signifies. More intense items are likely to be affirmed only by persons possessing higher total scores on a set of items, whereas easier or less intense items are likely to be affirmed by many persons, including those with lower total scores.<sup>10</sup>

**Figure 3: Example of a person-item distribution map showing person (red) and item (blue) locations in logits**



Logits possess several advantages over raw scores. Firstly, as these measures share a common unit on a common scale, researchers can readily visualise the order of difficulty or intensity of items relative to each other and can easily ascertain where any individual person is located in relation to all items.<sup>17</sup> Secondly, the conversion of ordinal data to equal-interval data means any difference in logits implies equal difference in ability or latent trait possession.<sup>17</sup> Item or person logit locations can therefore be summed and used in standard statistical analyses. Finally, unlike raw person and item scores, these measures allow comparisons between subjects from the same group to be made independently of the items chosen for comparison, and for comparisons between items to be made independently of which participants are used for the comparison.<sup>6</sup>

A variety of software programs are available to assess how well data conform to Rasch measurement criteria.<sup>18-20</sup> They function by producing both expected and observed values of person responses for comparison. Fit statistics and graphical inspection of these values help establish which persons and/or items should or should not be retained to ensure the best possible fit of data to the model,<sup>13</sup> specifically whether items can be considered to comprise a unidimensional measurement scale with equal-interval level

properties. If the data fit the model, the programs provide both item and person locations (raw scores transformed according to the Rasch logistic function) which can be plotted on the same continuum. The person locations may then be submitted to traditional statistics to test, for example, the significance of mean differences between groups of persons.

Checks are also made to determine if different groups within a sample (e.g. gender or age), despite having the same levels of the latent trait, respond differently to an individual item. This phenomenon is termed Differential Item Functioning (DIF). When DIF is present, the probability of an item response cannot be explained wholly by the respondents' levels of attitude and the difficulty of endorsing the item, as their performance is also influenced by another characteristic such as their gender or age.<sup>21</sup>

In Rasch analysis, no single test of fit statistic is paramount or sufficient, and each must be considered for comprehensive appraisal of the data.<sup>22</sup> Knowledge of the construct, scale, sample and test conditions will help to explain or theorise about any discrepancies between the model and the data. "Failure of the data to conform to the Rasch model implies further work on the substantive problem of scale construction, not on the identification of a more complex model that might account for the data".<sup>(8 p. 86)</sup> Refinement of poorly fitting items (e.g. removing items, splitting items, collapsing categories) is used to create a scale that better measures the latent trait under consideration.

The remainder of this paper details application of the Rasch model to measure attitudes towards abortion, along with an evaluation of the scale's properties. This same process could be applied to the measurement of other latent traits. The specific aim is to illustrate how a psychometrically sound unidimensional measure of adolescent attitudes and intentions towards abortion was created.

## Method

The "Adolescent Attitudes to Abortion (AAA) Scale" was derived using data from a multiphase research project entitled the "Teen Relationships Study".<sup>23</sup> This study aimed to explore biopsychosocial antecedents to adolescent pregnancy, and was conducted in Perth, Western Australia between 2006 and 2008 with adolescent samples.

Phase one of the "Teen Relationships Study" involved in-depth semi-structured interviews with a purposive sample of sexually active adolescent females (aged 14-19 years). Thematic analysis was performed on the narrative data and





prominent themes were identified. From these themes, attitude and intention items were created. Further detail of the method used to obtain these data and some of the thematic findings have been published elsewhere.<sup>24,25</sup>

In phase two of the “Teen Relationships Study,” attitude and intention items were integrated into an extensive questionnaire collecting demographic information and data on functioning in individual, family, and extrafamilial domains. To capture a range of sexual experiences and pregnancy outcomes, the questionnaire was administered to attendees of antenatal clinics (females), termination services (females) and secondary schools (males and females).

### Participants

In total 1681 adolescents, aged 12 to 19 years, responded to the questionnaire. Of the attitude and intention items relating to abortion (n=10), three items were female-specific and two items were given to males only. For the purpose of scale development, the sample size was amended to include only those individuals who answered all the items applicable to their gender (n=203 males, 510 females).

As there were nearly twice as many female respondents, a random sub-sample of 203 females was selected to make the size of each gender group equitable. This approach was taken to help ensure the final scale would be relevant to both sexes. Therefore, the final sample size used for the Rasch analysis was 406 participants.

Additional checks to ensure the scale content was meaningful to particular population subsets, including gender, were made. These checks, specifically assessment for DIF, are discussed later.

### Scale structure

The “AAA Scale” originally consisted of ten attitude and intention items relating to abortion, as listed in Table 1. Items were answered on a four-point Likert scale consisting of *strongly disagree*, *disagree*, *agree* and *strongly agree*; and were scored from 0 to 3 respectively. Items marked with an asterisk (\*) were reverse-scored. A higher score equated to greater support for terminating a pregnancy. Items preceded by an L were asked of both males and females, G items were only given to girls and B items to boys.

To establish the internal consistency and reliability of the set of items, all responses were analysed using the interactive computer program Rasch Unidimensional

Measurement Model 2030 (RUMM2030).<sup>20</sup>

**Table 1: Original Conceptualisation of the “Adolescent Attitudes to Abortion Scale” (n=10)**

Item	
L3	I would have an abortion if there was something wrong with the baby
L10*	I do not believe in abortion
L17	Abortion is a good option if you need to use it
L31*	I do not think abortion should be available
L39*	My family does not agree with abortion
G2	I would have an abortion if I was not ready to have a baby
B2	I would want my partner to have an abortion if I wasn't ready to have a baby
G5	I would have an abortion if I was raped and became pregnant
B5	It is okay for a girl to have an abortion if she was raped and became pregnant
G23	I would have an abortion if I didn't have a partner to support me

indicates item is reverse-scored

RUMM2030 ranked person locations and divided them into class intervals (CIs) of approximately equal numbers. The mean observed scores for each CI were then compared to the value expected by the Rasch model. The process, including the various output and fit statistics generated by RUMM2030, and how they are evaluated, is provided in the results section.

## Results

### Thresholds

The expectation is that response curves for each category and for each item function according to logical expectations and the requirements of the Rasch model, as shown in the CCCs in Figure 2. For the “AAA Scale” this means the response curves plot from left to right in order of increasing agreement. Therefore, the probability of selecting the “easiest” (least intense) option is more likely to occur amongst those scoring low on the scale overall (i.e. amongst individuals indicating a low support for abortion), and those who scored higher on the overall scale would have a greater probability of selecting a more intense, higher-scoring response option. In addition to viewing CCCs, a table detailing the logit locations of threshold points can be examined to detect any disordered thresholds.

Disordered thresholds are indicative of broader validity and reliability issues.<sup>6</sup> Before any additional assessment of fit to the Rasch model was made, the possibility of correcting such thresholds was explored by collapsing adjacent categories where the problem occurred.

Table 2 illustrates threshold locations for two items from the “AAA Scale”. Item B5 had thresholds that were reversed and therefore were not operating according to logical expectations or the requirements of the model. The

highlighted section of the table illustrates that the second threshold occurred before the first. In comparison, the thresholds for item G5 operated as expected and were ordered sequentially.

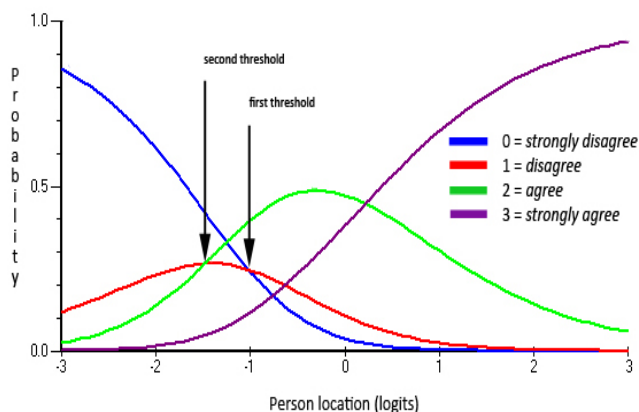
**Table 2: Threshold Values for two Items from the “Adolescent Attitudes to Abortion Scale”**

Item	Thresholds		
	1 strongly disagree/disagree	2 disagree/agree	3 strongly agree/agree
G5	-1.14	0.26	0.89
B5	-0.24	-0.77	1.01 *

indicates reversed thresholds

Assessment of the CCC for item B5, as illustrated in Figure 4, highlights these disordered thresholds graphically. The figure illustrates that the first threshold (i.e. where the probability of responding in either category 0 or 1 intersect) occurred *after* the second threshold (where categories 1 and 2 intersect) along the logit continuum. This would mean that for persons located anywhere along the response continuum, and especially for those persons located at the maximum value for this category, disagreeing with the item (i.e. selecting category 1) is never the most probable response.

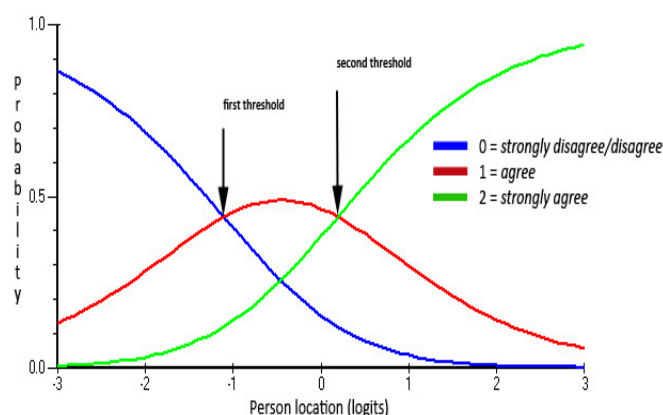
**Figure 4: Category characteristic curve for item B5 with disordered thresholds**



To address these disordered thresholds, before any additional assessment of fit to the Rasch model was made, the response categories for this item were reduced from four categories to three. This was achieved by rescoring as follows: 0/1=0, 2=1, and 3=2. In descriptive terms this meant combining *strongly disagree* and *disagree*, leaving *agree* and *strongly agree* separate. Figure 5 illustrates the CCC for item B5 after the categories were rescored. It can be seen that the thresholds now operated correctly.

As correctly ordered response category thresholds are an integral test of fit to the Rasch model, the remainder of the analyses were carried out using the rescored data.

**Figure 5: Category characteristic curve for item B5 with ordered thresholds**



### Item Fit

Fit of the individual items to the model was examined via individual item log residual test of fit statistics, the item-trait interaction test of fit (a chi-square test) and graphical inspection of the ICCs. Results of all three were taken into account when making decisions about fit or misfit to the model.

A negative fit residual indicates the item is over-discriminating in relation to the discrimination of all items taken as a whole, and a positive value suggests the item is less discriminating. Log residual test of fit statistics within the range -2.5 to 2.5 are usually acceptable.<sup>26</sup>

The hypothesis of the chi-square test is that there is no difference between the observed and theoretical values for a particular ICC. Therefore, p-values of less than 0.05, which show that there is a difference, indicate poor fit of the item to the model.  $\chi^2$  values may vary in size and if ranked, may increase gradually, but ideally there should be no sudden increases in size and none should be statistically significant.<sup>27</sup>

Table 3 illustrates item fit statistics for the original 10 items of the “AAA Scale”, arranged by increasing  $\chi^2$  value. The location is the item intensity measured in logits. Most of the statistics comply with criteria for good data to model fit: low log residuals ( $<\pm 2.5$ ) and high  $\chi^2$  probability ( $p>0.05$ ). To account for multiple testing, Bonferroni adjustments<sup>28</sup> were made to the chi-square significance tests based on the number of items in the scale.

Table 3 indicates that two items do not fit the model well. Item L39 has a log residual greater than the maximum set and L31 registers a high  $\chi^2$  value.

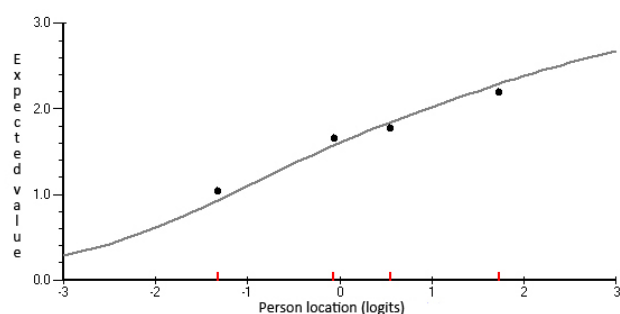
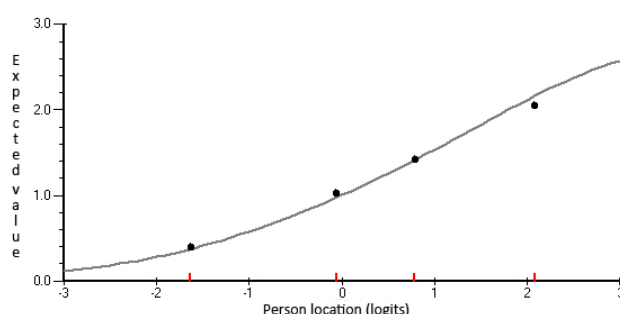


**Table 3: Item Fit Statistics for all Items of the “Adolescent Attitudes to Abortion Scale” (n=10)**

Item	Location	Log residual	$\chi^2$	p
G5	-0.72	0.55	1.48	0.69
G2	-0.25	0.28	1.79	0.62
L3	0.70	0.23	2.56	0.46
G23	0.94	0.52	2.58	0.46
L17	0.15	-0.48	2.78	0.43
L10	-0.14	-2.03	3.02	0.39
B5	-0.46	-0.28	4.40	0.22
<b>L39</b>	<b>0.03</b>	<b>2.86</b>	<b>4.72</b>	<b>0.19</b>
B2	0.36	-0.74	7.04	0.07
<b>L31</b>	<b>-0.61</b>	<b>-1.77</b>	<b>12.80</b>	<b>0.01</b>

After removing item L31 and recalculating the item fit statistics, all  $\chi^2$  values complied but the fit residual for L39 remained high (3.32).

Finally, graphical inspection of the ICCs for each item was made to examine the fit between expected and observed values. The ICC for item L39, now considered the worst-fitting item, is illustrated in Figure 6. The average response of persons within each class interval (CI) is represented graphically by a dot and expected values are represented by the solid curve. As these points were closely aligned, item L39 was retained. The ICC for the best-fitting item, G23, is shown in Figure 7 for comparative purposes.

**Figure 6: Item Characteristic Curve for worst-fitting item (L39)****Figure 7: Item Characteristic Curve for best-fitting item (G23)**

Overall fit of the items to the Rasch model was examined by assessing the mean item log residual test of fit. For items to fit the model, the mean across all items should be close to 0 and the standard deviation close to 1.<sup>26</sup> A mean item fit residual of -0.05 (SD=1.43) indicated overall item fit was acceptable for the “AAA Scale”.

### Differential Item Functioning

To assess DIF, an F-test for each item was performed to determine if the obtained mean location values were statistically comparable, irrespective of what group the person may have belonged to. In an F-test, if the two variances used for comparison are equal, they are considered to be from the same population. Bonferroni adjustments were also made for these tests.

The “AAA Scale” displayed no evidence of DIF within the following groups: males and females; those reporting previous sexual experience versus those with no prior experience; and amongst people with different pregnancy histories. Thus direct comparisons of mean locations for these groups can be made as the construct has the same meaning across sub-groups.

### Person fit

The fit of individual persons to the model was assessed via person fit residuals. Log residual values less than -2.5 indicate a purer Guttman response pattern than expected and may indicate a problem if the value is very low (e.g. the persons could be responding according to a mental set or fixed pattern of thinking). Values exceeding 2.5 indicate a response pattern that is disordered more than expected and may indicate carelessness or low motivation in responding. Both extremes were investigated to determine whether to remove such persons from the sample.<sup>29</sup>

Of the final sample of 406 participants, 29 individuals displayed person fit log residuals outside the range -2.5 to 2.5. As these residuals were all negative and their removal did not change the overall fit of the data to the Rasch model, a decision was taken to retain all persons.

Overall fit of persons to the model was examined via the mean person log residual test of fit. Like the item log residual test of fit, it is expected to approximate a Normal distribution ( $\bar{x}=0$ , SD=1).<sup>26</sup> A mean person log residual test of fit of -0.57 (SD=1.36) indicated overall person fit was reasonable.

### Overall fit to the Rasch model

The item-trait interaction statistic is a measure of the overall fit of the data to the Rasch model. A statistically



significant result on this chi-square test indicates that some items do not fit the model. Misfit would indicate that the items are assessing something in addition to, or other than, the property or construct of interest.

For the “AAA Scale” the non-significant total item-trait interaction test of fit ( $\chi^2=32.04$ ,  $df=27$ ,  $p=0.23$ ) indicated that invariance was maintained along the latent trait. Together with the other tests of fit, this meant the items were internally consistent and can be accepted as forming a single variable at this level of scale. The interval-level locations (scores), which the Rasch transformation produced, can be used for further statistical analyses such as comparisons of mean locations for various groups of persons.

### Item/person distribution

The targeting of items and persons was assessed by viewing the person-item location distribution map, where person locations are plotted together with item locations or item threshold locations on the same continuum. The distributions of person (for both gender groups) and item threshold locations are represented in Figure 8. The figure illustrates that whilst the items are reasonably well distributed, some individuals (of both genders) cannot be measured as reliably as the majority by this set of items. This is because they find the items either too intense or not intense enough for them. These areas have been highlighted by black circles. Females were more widely distributed along the continuum than males.

**Figure 8: Person-item threshold distribution map for the “Adolescent Attitudes to Abortion Scale.”**

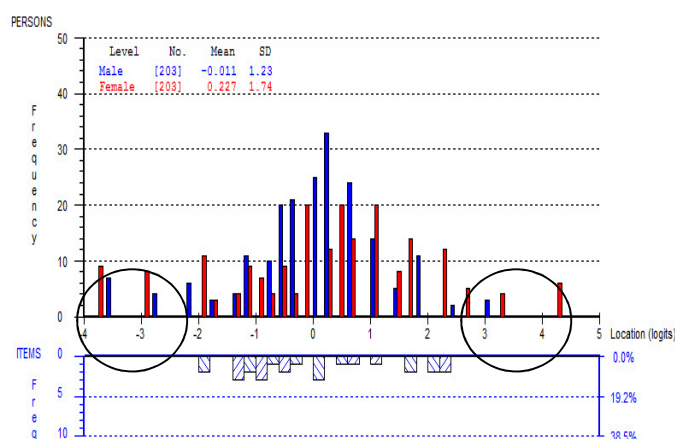


Table 4 summarises the comparisons amongst mean person location scores of different population groups, revealing that support for abortion was greatest amongst older individuals, females, those from non-Aboriginal or Torres Strait Islander (ATSI) backgrounds, individuals with no religious affiliations, and those who reported being sexually

active. Persons with a previous experience of pregnancy also showed greater support for abortion services, with the greatest support shown by those participants reporting a previous abortion.

**Table 4: Relative Mean Scale Scores for Different Sub-groups responding to the “Adolescent Attitudes to Abortion Scale”**

Support for abortion	
Age	increased with age
Gender	females > males
ATSI status	non-ATSI > ATSI
Religious affiliation	no religion > religious
Sexual activity	sexually active > not yet sexually active
Pregnancy history	history of pregnancy > never been pregnant
Pregnancy outcome	history of abortions only > history of live births only > never been pregnant

### Order and location of items

Examining the order and location of items provides further evidence of scale validity. A well-developed scale will possess item locations that are evenly distributed along the logit continuum and the ranked order of item difficulties or intensities should make sense empirically.

Table 5 lists the final set of items by increasing location (in logits) along the continuum, along with the final response categories used. The table illustrates that items B5 and G5 were the “easiest” for participants to agree with and item G23 was the most “difficult”; with the order of intensity making sense intuitively.

**Table 5: Final List of Items in the “Adolescent Attitudes to Abortion Scale” (location order) (n=9)**

Item	Location	Response categories
B5 It is okay for a girl to have an abortion if she was raped and became pregnant	-0.798	SD/D, A, SA
G5 I would have an abortion if I was raped and became pregnant	-0.483	SD, D, A, SA
B2 I would want my partner to have an abortion if I wasn't ready to have a baby	-0.326	SD, D, A, SA
L10* I don't believe in abortion	-0.206	SD, D, A, SA
L39* My family does not agree with abortion	-0.04	SD, D, A, SA
L17 Abortion is a good option if you need to use it	0.074	SD, D, A, SA
G2 I would have an abortion if I was not ready to have a baby	0.315	SD, D, A, SA
L3 I would have an abortion if there was something wrong with the baby	0.628	SD, D, A, SA
G23 I would have an abortion if I did not have a partner to support me	0.836	SD, D, A, SA

\* indicates items is reverse-scored



As a spread of -3 to +3 logits is usually considered adequate,<sup>6</sup> the logit values in Table 5 (together with the graphical illustration shown in Figure 8) confirms that more and less intense items could be included to better distinguish between participants at both extremes of the scale.

### Reliability

An indication of the reliability of the scale is provided by the Person Separation Index (PSI), the Rasch equivalent of Cronbach's  $\alpha$ . This index indicates how well the scale can distinguish amongst persons in terms of their latent trait locations.

For the "AAA Scale" the PSI was 0.82, indicating good reliability. A Cronbach's  $\alpha$  statistic could not be calculated as the final scale included gender-specific items which resulted in missing data for each respondent.

### Discussion

On the basis of the analyses described here, the final nine item "AAA Scale" can be accepted as an effective and valid measurement tool for the assessment of adolescent attitudes and intentions towards abortion, demonstrating good reliability. The scale is unidimensional and interval-level scores of attitude were obtained.

The rescoring of item B5 and removal of item L31 provided the best fit between the data and the Rasch model. Future application of this scale may require re-wording of the response categories for item B5, with subsequent re-testing. To make male and female versions of the scale congruent, the response categories for the similarly-worded item G5 could also be revised, although Rasch analysis did not deem it necessary. Whilst it is not ideal to reduce categories post hoc, these analyses indicate that item B5 operated more effectively with fewer categories and that rescoring was justified.

Mean person locations for different population groups matched expectations. For example, support for abortion was strongest amongst females and those self-reporting a previous abortion. Such results provide further evidence of the scale's validity.

The addition of more and less intense items would enable the scale to make better distinctions between people with very high or very low total scores. As it currently exists, the absence of DIF indicates that the scale could be administered to participants of different gender and to those with different sexual and/or pregnancy experiences, without concern that the items may mean something different to these population subsets.

The creation of interval-level measures by the "AAA Scale" allows intensity of attitude to be more explicitly measured than previously developed ordinal scales measuring attitudes towards abortion.<sup>30-33</sup> For example, the correlations between attitude and behaviour can be examined with greater specificity; and Rasch person locations will enable the investigation of changes in these measures over time and between groups to be undertaken with greater precision.

Another benefit the "AAA Scale" has over previous measurement scales is that the estimated item parameters and person values derived from the Rasch model are not sample-dependent (if no DIF is present and a reasonable range of persons have been used for the analysis), whereas important statistics about test items (e.g. their difficulty) derived through traditional methods can only be confidently generalised to the population from which the sample was drawn.<sup>2</sup> Most other scales also require all items to be administered to derive and interpret scores. Calibration of items using Rasch methods remain independent of the sample used and enable individuals to obtain the same score irrespective of what items are answered;<sup>34</sup> meaning missing data can be accommodated.

There are some limitations of this study. Firstly, the scale items were developed and then administered to the sample prior to any application of the Rasch paradigm. However, whilst the Rasch paradigm and model could have been utilised in the initial development and trialling of items, it is not uncommon for it to be used in the improvement and/or assessment of existing scales. O'Connor<sup>13</sup> provides several examples of how the Rasch model has been subsequently applied to health outcome measures that were established by other theoretical approaches.

Secondly, the sampling framework resulted in a relatively homogenous sample of adolescents. Although Rasch analysis enables scores to be calibrated independently of the distribution of item responses,<sup>34</sup> further analyses need to be carried out with more diverse populations before applying the scoring mechanism more widely.

Finally, although the final nine items demonstrated close adherence to the principles of objective measurement, the study did not afford the opportunity to re-test them in the same population.

### Conclusion

The Rasch unidimensional measurement model is a simple and effective tool in the development of attitude measurement scales. This paper described how the model



was used to develop a scale measuring attitudes towards abortion; with an emphasis on illustrating the psychometric properties of the scale. If fit to the model is satisfactory, interval-level item and person locations can be produced that are invariant in nature. The information about fit allows researchers to better understand the strengths and weaknesses of their scales, providing clear direction for future amendments of scale items and further understanding of the construct of interest.

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## **PEER REVIEW**

Not commissioned. Externally peer reviewed

## **CONFLICTS OF INTEREST**

The authors declare that they have no competing interests.

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## **ETHICS COMMITTEE APPROVAL**

- King Edward Memorial Hospital Human Research Ethics Committee
- Western Australian Aboriginal Health Information and Ethics Committee
- Curtin University Human Research Ethics Committee

## APPENDIX C

*Results relating to application of the “Adolescent Attitudes to Abortion Scale”*

**Table C.1**

**Rasch Mean AAA Scale Locations (Comparisons by Sexual Activity Status within Gender)**

<sup>Δ</sup>SA = sexually active (any sexual activity i.e. oral sex and/or intercourse), sexual activity status missing for two males and six females.

Note: % do not sum to 100% if missing data

		MALES					FEMALES				
<i>Total n=1470</i>		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=326	SA <sup>Δ</sup> n=111	p	% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=590	SA <sup>Δ</sup> n=443	p
All				Mean (SD) -0.05 (1.16)	Mean (SD) 0.48 (1.12)	<0.001			Mean (SD) -0.13 (1.54)	Mean (SD) 0.67 (1.52)	<0.001
<b>GENERAL</b>											
Age	≤13	22	8	-0.08 (1.35)	0.99 (1.14)	0.025	20	4	-0.27 (1.40)	0.80 (1.02)	0.002
	14-15	72	79	-0.04 (1.09)	0.41 (1.09)	0.001	69	30	-0.06 (1.50)	0.44 (1.43)	0.001
	≥16	6	13	-0.09 (1.30)	0.61 (1.29)	0.124	11	66	-0.31 (1.93)	0.76 (1.58)	<0.001
ATSI	No	96	92	-0.06 (1.18)	0.51 (1.16)	<0.001	98	93	-0.14 (1.53)	0.73 (1.48)	<0.001
	Yes	4	8	0.29 (0.75)	0.09 (0.41)	0.485	2	7	0.41 (1.70)	-0.27 (1.82)	0.279
English spoken at home	No	1	1	-0.90 (1.51)	-2.04 (0.00)	0.581	1	1	-1.72 (1.52)	0.43 (1.60)	0.107
	Yes	98	99	-0.05 (1.15)	0.50 (1.10)	<0.001	98	99	-0.11 (1.54)	0.67 (1.52)	<0.001
Religious affiliation	None	39	60	0.34 (0.97)	0.51 (1.18)	0.281	33	56	0.34 (1.30)	0.74 (1.48)	0.004
	Christianity	52	32	-0.32 (1.19)	0.51 (0.92)	<0.001	63	42	-0.37 (1.61)	0.54 (1.57)	<0.001
	Other	7	7	-0.18 (1.39)	0.14 (1.44)	0.589	4	3	-0.13 (1.43)	1.19 (1.50)	0.013
<b>FAMILY BACKGROUND</b>											
Mother working	No	21	16	-0.21 (1.28)	-0.10 (1.04)	0.740	18	26	-0.04 (1.48)	0.59 (1.68)	0.003
	Yes	71	74	0.02 (1.10)	0.58 (1.15)	<0.001	75	65	-0.12 (1.58)	0.76 (1.44)	<0.001
Father working	No	3	6	-0.70 (1.34)	0.73 (1.29)	0.039	4	9	-0.19 (1.47)	0.56 (1.60)	0.068
	Yes	85	80	-0.04 (1.15)	0.43 (1.11)	0.001	85	73	-0.12 (1.58)	0.81 (1.48)	<0.001
Mother's highest education level	Unsure	27	17	-0.11 (1.01)	0.79 (1.19)	0.001	20	16	0.00 (1.48)	0.51 (1.34)	0.021
	Some school	10	15	0.06 (1.15)	-0.01 (0.92)	0.841	13	27	-0.10 (1.49)	0.46 (1.73)	0.019
	TAFE/trade/completed high school	33	35	-0.05 (1.20)	0.52 (1.24)	0.013	32	37	-0.15 (1.57)	0.90 (1.33)	<0.001
	University	28	32	-0.04 (1.29)	0.51 (1.00)	0.024	34	16	-0.20 (1.59)	0.78 (1.63)	<0.001

APPENDIX C  
Results relating to application of the “Adolescent Attitudes to Abortion Scale”

Table C.1 continued...

		MALES					FEMALES				
<b>Total n=1470</b>		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=326	SA <sup>Δ</sup> n=111	p	% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=590	SA <sup>Δ</sup> n=443	p
				Mean (SD)	Mean (SD)				Mean (SD)	Mean (SD)	
Father's highest education level	<i>Unsure</i>	25	20	-0.05 (1.20)	0.64 (1.04)	0.015	25	19	-0.06 (1.27)	0.36 (1.44)	0.023
	<i>Some school</i>	12	18	0.01 (1.20)	0.41 (1.23)	0.238	12	23	-0.29 (1.56)	0.54 (1.51)	0.001
	<i>TAFE/trade/completed high school</i>	34	37	-0.09 (1.17)	0.33 (1.14)	0.053	25	32	-0.23 (1.62)	0.85 (1.33)	<0.001
	<i>University</i>	25	23	-0.07 (1.16)	0.58 (1.09)	0.014	35	16	-0.04 (1.66)	0.98 (1.75)	<0.001
<b>ALCOHOL AND/OR OTHER DRUG USE</b>											
Mother smoked ever	<i>No</i>	82	70	-0.10 (1.19)	0.55 (1.20)	<0.001	87	56	-0.16 (1.55)	0.78 (1.56)	<0.001
	<i>Yes</i>	15	27	0.21 (1.03)	0.32 (0.94)	0.632	12	40	0.14 (1.48)	0.59 (1.44)	0.028
Father smoked ever	<i>No</i>	75	73	-0.08 (1.21)	0.49 (1.15)	<0.001	78	51	-0.13 (1.53)	0.84 (1.48)	<0.001
	<i>Yes</i>	20	23	0.06 (0.97)	0.38 (1.04)	0.158	18	38	-0.16 (1.61)	0.48 (1.48)	0.001
Mother drinks alcohol	<i>No/occasional</i>	81	85	-0.11 (1.19)	0.41 (1.12)	<0.001	84	76	-0.20 (1.52)	0.63 (1.53)	<0.001
	<i>Yes</i>	16	14	0.22 (1.07)	0.92 (1.15)	0.032	15	20	0.26 (1.66)	0.92 (1.46)	0.005
Father drinks alcohol	<i>No/occasional</i>	66	67	-0.13 (1.23)	0.30 (1.10)	0.007	72	56	-0.17 (1.51)	0.64 (1.49)	<0.001
	<i>Yes</i>	29	30	0.09 (1.04)	0.82 (1.11)	0.001	25	33	-0.01 (1.65)	0.79 (1.47)	<0.001
Ever smoked	<i>No</i>	81	56	-0.05 (1.15)	0.47 (1.15)	0.002	84	26	-0.16 (1.53)	0.69 (1.58)	<0.001
	<i>Yes</i>	17	43	-0.01 (1.14)	0.52 (1.10)	0.016	16	74	-0.04 (1.54)	0.66 (1.50)	<0.001
Ever drunk alcohol	<i>No</i>	16	9	-0.50 (1.25)	0.15 (1.41)	0.147	15	2	-0.44 (1.48)	-0.05 (1.67)	0.482
	<i>Yes</i>	74	86	0.03 (1.12)	0.55 (1.10)	<0.001	77	96	-0.08 (1.56)	0.68 (1.53)	<0.001
Ever used illicit drugs	<i>No</i>	93	86	-0.05 (1.17)	0.47 (1.16)	<0.001	95	61	-0.14 (1.53)	0.50 (1.52)	<0.001
	<i>Yes</i>	7	14	-0.06 (1.14)	0.54 (0.87)	0.085	5	39	0.10 (1.76)	0.93 (1.48)	0.009
Alcohol/drug problems in family	<i>No</i>	86	78	-0.05 (1.19)	0.57 (1.18)	<0.001	89	61	-0.11 (1.54)	0.70 (1.44)	<0.001
	<i>Yes</i>	13	21	0.03 (0.97)	0.17 (0.80)	0.561	10	39	-0.39 (1.48)	0.63 (1.65)	<0.001
Alcohol/drug problems with close friend or boy/girlfriend	<i>No</i>	90	66	-0.07 (1.15)	0.43 (1.13)	0.001	84	50	-0.20 (1.53)	0.70 (1.46)	<0.001
	<i>Yes</i>	10	32	0.29 (1.25)	0.64 (1.10)	0.223	15	49	0.17 (1.55)	0.64 (1.58)	0.018
Parents would find out if drank alcohol	<i>No</i>	35	56	0.20 (1.06)	0.73 (1.24)	0.004	35	57	0.12 (1.47)	0.74 (1.55)	<0.001
	<i>Yes</i>	60	40	-0.18 (1.20)	0.21 (0.88)	0.043	58	33	-0.23 (1.56)	0.59 (1.43)	<0.001



APPENDIX C  
Results relating to application of the “Adolescent Attitudes to Abortion Scale”

Table C.1 continued...

MALES							FEMALES						
		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=326	SA <sup>Δ</sup> n=111	p			% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=590	SA <sup>Δ</sup> n=443	p
Total n=1470													
				Mean (SD)	Mean (SD)					Mean (SD)	Mean (SD)		
FAMILY FUNCTIONING													
Lives with both parents	No	22	34	-0.01 (0.99)	0.34 (1.00)	0.086		19	61	-0.12 (1.50)	0.55 (1.51)	<0.001	
	Yes	78	66	-0.06 (1.21)	0.55 (1.18)	<0.001		81	39	-0.13 (1.55)	0.85 (1.52)	<0.001	
Family supportive	No	1	5	-0.06 (0.55)	0.92 (1.29)	0.197		2	5	0.11 (1.09)	0.92 (0.87)	0.021	
	Yes	95	92	-0.05 (1.17)	0.47 (1.12)	<0.001		92	86	-0.16 (1.55)	0.61 (1.55)	<0.001	
Ask parents for help with personal problems	No	18	22	-0.06 (1.09)	0.71 (1.21)	0.006		21	24	-0.09 (1.57)	0.66 (1.52)	<0.001	
	Yes	81	77	-0.05 (1.17)	0.43 (1.09)	0.001		78	73	-0.14 (1.52)	0.65 (1.52)	<0.001	
Family rules are clear	No	13	16	0.14 (0.90)	0.50 (1.13)	0.180		17	26	0.22 (1.40)	0.56 (1.56)	0.092	
	Yes	87	84	-0.08 (1.20)	0.48 (1.12)	<0.001		83	74	-0.20 (1.56)	0.71 (1.51)	<0.001	
Parents control everything	No	62	58	-0.07 (1.17)	0.36 (1.03)	0.009		59	62	-0.14 (1.49)	0.70 (1.50)	<0.001	
	Yes	37	41	-0.01 (1.17)	0.57 (1.13)	0.004		39	34	-0.12 (1.59)	0.78 (1.53)	<0.001	
Parents ask my thoughts before family decisions affecting me are made	No	25	28	-0.04 (1.22)	0.50 (1.13)	0.036		24	33	-0.04 (1.57)	0.61 (1.40)	<0.001	
	Yes	73	70	-0.05 (1.16)	0.46 (1.13)	0.001		74	64	-0.18 (1.51)	0.76 (1.54)	<0.001	
Parents overprotect	No	77	68	-0.06 (1.13)	0.33 (1.04)	0.007		70	71	-0.11 (1.51)	0.76 (1.49)	<0.001	
	Yes	22	31	-0.01 (1.30)	0.82 (1.25)	0.003		28	24	-0.19 (1.59)	0.54 (1.60)	<0.001	
NEIGHBOURHOOD													
Number of homes lived in since birth	1-3	55	50	-0.03 (1.16)	0.47 (1.13)	0.005		61	39	-0.19 (1.52)	0.90 (1.42)	<0.001	
	≥4	43	48	-0.10 (1.17)	0.40 (1.00)	0.007		37	59	-0.06 (1.55)	0.53 (1.58)	<0.001	
Years at current address	≤1 year	8	8	0.16 (0.94)	0.14 (0.71)	0.940		13	31	-0.14 (1.52)	0.53 (1.58)	0.003	
	>1 year	89	89	-0.07 (1.16)	0.50 (1.13)	>0.001		86	67	-0.14 (1.55)	0.73 (1.50)	<0.001	
	<1 year	7	7	0.21 (0.98)	0.07 (0.72)	0.716		11	28	-0.17 (1.54)	0.53 (1.57)	0.004	

APPENDIX C  
Results relating to application of the “Adolescent Attitudes to Abortion Scale”

Table C.1 continued...

		MALES					FEMALES				
<b>Total n=1470</b>		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=326	SA <sup>Δ</sup> n=111	p	% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=590	SA <sup>Δ</sup> n=443	p
				<b>Mean (SD)</b>	<b>Mean (SD)</b>				<b>Mean (SD)</b>	<b>Mean (SD)</b>	
	1-5 years	40	35	-0.22 (1.16)	0.64 (1.14)	<0.001	33	36	-0.18 (1.60)	0.61 (1.50)	<0.001
	>5 years	50	55	0.06 (1.15)	0.41 (1.11)	0.039	56	35	-0.10 (1.51)	0.82 (1.51)	<0.001
Safe neighbourhood	Disagree/unsure	13	19	-0.20 (1.47)	0.58 (1.40)	0.049	14	24	-0.20 (1.51)	0.67 (1.69)	<0.001
	Agree	87	81	-0.04 (1.10)	0.46 (1.05)	<0.001	86	75	-0.12 (1.55)	0.66 (1.47)	<0.001
Clean neighbourhood	Disagree/unsure	17	19	-0.18 (1.45)	0.56 (1.38)	0.048	15	21	-0.14 (1.59)	0.56 (1.80)	0.006
	Agree	82	80	-0.04 (1.08)	0.48 (1.05)	<0.001	85	78	-0.14 (1.53)	0.69 (1.44)	<0.001
Theft/vandalism in neighbourhood	No/unsure	31	31	-0.12 (0.98)	0.30 (0.99)	0.031	30	23	-0.22 (1.54)	0.63 (1.74)	<0.001
	Yes	68	69	-0.04 (1.23)	0.56 (1.17)	<0.001	69	77	-0.10 (1.54)	0.67 (1.46)	<0.001
Violence (any) in neighbourhood	No/unsure	71	66	-0.11 (1.10)	0.51 (1.18)	<0.001	78	46	-0.15 (1.55)	0.72 (1.53)	<0.001
	Yes	28	34	0.08 (1.29)	0.42 (1.01)	0.141	22	53	-0.08 (1.52)	0.62 (1.52)	<0.001
Domestic violence in neighbourhood	No/unsure	81	77	-0.09 (1.13)	0.53 (1.15)	<0.001	88	60	-0.13 (1.54)	0.73 (1.53)	<0.001
	Yes	17	23	0.07 (1.28)	0.33 (1.02)	0.372	12	40	-0.16 (1.59)	0.57 (1.52)	0.001
Participated in sport/recreation activities during last 12 months	No	18	12	-0.10 (1.15)	0.29 (1.07)	0.270	23	46	-0.17 (1.39)	0.58 (1.54)	<0.001
	Yes	81	88	-0.05 (1.16)	0.51 (1.13)	<0.001	76	53	-0.13 (1.59)	0.74 (1.51)	<0.001
Participated in youth group activities during last 12 months	No	67	65	0.05 (1.08)	0.46 (1.19)	0.007	67	78	0.10 (1.51)	0.81 (1.44)	<0.001
	Yes	31	35	-0.31 (1.29)	0.51 (0.99)	<0.001	32	21	-0.66 (1.47)	0.19 (1.73)	<0.001
<b>SCHOOL</b>											
Ever repeated a year at school	No	94	88	-0.05 (1.17)	0.51 (1.14)	<0.001	96	90	-0.14 (1.55)	0.68 (1.54)	<0.001
	Yes	6	12	-0.09 (1.13)	0.26 (0.93)	0.359	3	9	0.02 (1.12)	0.61 (1.38)	0.127
Ever skipped school	No	76	69	-0.07 (1.15)	0.48 (1.14)	<0.001	84	30	-0.19 (1.53)	0.60 (1.55)	<0.001
	Yes	22	30	0.04 (1.25)	0.55 (1.03)	0.043	16	27	0.15 (1.56)	0.65 (1.51)	0.018
<b>PSYCHOLOGICAL SCALES</b>											

APPENDIX C  
Results relating to application of the “Adolescent Attitudes to Abortion Scale”

Table C.1 continued...

		MALES					FEMALES				
<b>Total n=1470</b>		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=326	SA <sup>Δ</sup> n=111	p	% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=590	SA <sup>Δ</sup> n=443	p
				Mean (SD)	Mean (SD)				Mean (SD)	Mean (SD)	
Low personal self-efficacy <sup>*</sup>	Normal	44	50	-0.11 (1.27)	0.48 (1.08)	0.003	43	40	0.74 (1.54)	0.20 (1.61)	<0.001
	Borderline/Low self-efficacy	37	33	-0.01 (1.03)	0.54 (1.29)	0.008	42	41	-0.04 (1.52)	0.70 (1.44)	<0.001
Low self-esteem <sup>†</sup>	No	84	86	-0.06 (1.17)	0.51 (1.12)	<0.001	82	72	-0.20 (1.50)	0.72 (1.56)	<0.001
	Yes	9	9	-0.23 (1.21)	0.37 (1.18)	0.180	14	21	0.17 (1.74)	0.60 (1.42)	0.078
SDQ Emotional difficulties <sup>‡</sup>	Normal	92	92	-0.06 (1.16)	0.51 (1.12)	<0.001	82	73	-0.10 (1.46)	0.66 (1.57)	<0.001
	Borderline/abnormal	6	7	0.07 (1.15)	0.15 (1.24)	0.865	18	26	-0.30 (1.81)	0.69 (1.38)	<0.001
SDQ Conduct problems <sup>‡</sup>	Normal	75	59	-0.05 (1.16)	0.38 (1.20)	0.009	83	69	-0.16 (1.50)	0.65 (1.55)	<0.001
	Borderline/abnormal	24	41	-0.06 (1.17)	0.64 (0.99)	0.001	16	31	0.00 (1.68)	0.72 (1.46)	0.001
SDQ Hyperactivity <sup>‡</sup>	Normal	72	61	-0.04 (1.15)	0.43 (1.06)	0.003	71	62	-0.22 (1.50)	0.60 (1.59)	<0.001
	Borderline/abnormal	27	38	-0.11 (1.21)	0.57 (1.22)	0.004	29	37	0.07 (1.58)	0.79 (1.39)	<0.001
SDQ Peer problems <sup>‡</sup>	Normal	79	77	-0.05 (1.21)	0.46 (1.15)	0.001	85	76	-0.08 (1.49)	0.73 (1.53)	<0.001
	Borderline/abnormal	20	22	-0.10 (0.98)	0.56 (1.02)	0.006	15	23	-0.46 (1.72)	0.46 (1.46)	<0.001
SDQ Prosocial scale <sup>‡</sup>	Normal	63	68	-0.12 (1.28)	0.48 (1.15)	<0.001	86	85	-0.21 (1.53)	0.65 (1.50)	<0.001
	Borderline/abnormal	36	32	0.05 (0.93)	0.50 (1.07)	0.017	13	14	0.36 (1.41)	0.78 (1.64)	0.103
SDQ Total difficulties <sup>‡</sup>	Normal	79	69	-0.06 (1.16)	0.45 (1.15)	0.001	80	63	-0.14 (1.47)	0.70 (1.58)	<0.001
	Borderline/abnormal	20	30	-0.02 (1.17)	0.56 (1.08)	0.019	20	37	-0.09 (1.77)	0.61 (1.42)	<0.001
<b>FRIENDSHIPS</b>											
Experienced negative treatment by others	No	3	2	-0.38 (1.22)	1.11 (1.47)	0.162	3	1	-0.04 (1.97)	0.65 (0.87)	0.506
	Yes	96	98	-0.04 (1.16)	0.47 (1.12)	<0.001	96	99	-0.14 (1.51)	0.67 (1.53)	<0.001
Any close friends	No	4	3	0.05 (0.75)	0.16 (0.48)	0.827	3	2	0.02 (1.65)	0.81 (1.41)	0.237

<sup>\*</sup> Score derived from Cowen’s Personal Self-Efficacy Scale (Cowen, et al., 1991).

<sup>†</sup> Score derived from Rosenberg’s Self-Esteem Scale (Rosenberg, 1989).

<sup>‡</sup> Score and sub-scales derived from Strengths and Difficulties Questionnaire (Goodman, 1999).

APPENDIX C  
Results relating to application of the “Adolescent Attitudes to Abortion Scale”

Table C.1 continued...

		MALES					FEMALES				
		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=326	SA <sup>Δ</sup> n=111	p	% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=590	SA <sup>Δ</sup> n=443	p
<b>Total n=1470</b>											
				<b>Mean (SD)</b>	<b>Mean (SD)</b>				<b>Mean (SD)</b>	<b>Mean (SD)</b>	
	Yes	95	96	-0.06 (1.18)	0.51 (1.12)	<0.001	96	98	-0.14 (1.53)	0.67 (1.53)	<0.001
Importance of friendships	Less	20	13	0.10 (1.12)	0.47 (1.11)	0.259	6	18	-0.54 (1.28)	0.28 (1.80)	0.016
	More	78	87	-0.09 (1.17)	0.48 (1.13)	<0.001	93	81	-0.11 (1.54)	0.75 (1.45)	<0.001
Friends mainly from school	No	14	23	-0.20 (1.43)	0.36 (1.11)	0.092	13	37	-0.25 (1.73)	0.70 (1.49)	<0.001
	Yes	86	77	-0.02 (1.12)	0.51 (1.12)	<0.001	86	62	-0.12 (1.50)	0.64 (1.54)	<0.001
Friends of both sexes	No	37	23	0.09 (1.04)	0.25 (1.18)	0.489	42	24	-0.25 (1.39)	0.67 (1.51)	<0.001
	Yes	63	77	-0.13 (1.23)	0.55 (1.10)	<0.001	58	75	-0.05 (1.63)	0.66 (1.53)	<0.001
Friends mainly of same sex	No	65	77	-0.11 (1.16)	0.45 (1.13)	<0.001	51	77	-0.05 (1.56)	0.67 (1.51)	<0.001
	Yes	35	23	0.05 (1.17)	0.58 (1.11)	0.039	49	22	-0.23 (1.50)	0.65 (1.56)	<0.001
Friends mainly of opposite sex	No	90	81	-0.02 (1.16)	0.53 (1.13)	<0.001	93	79	-0.13 (1.52)	0.65 (1.57)	<0.001
	Yes	10	19	-0.28 (1.19)	0.28 (1.07)	0.083	7	21	-0.30 (1.73)	0.73 (1.35)	<0.001
Friends mainly of same age	No	24	32	-0.16 (1.21)	0.18 (1.03)	0.151	20	47	-0.11 (1.63)	0.73 (1.50)	<0.001
	Yes	76	68	-0.02 (1.15)	0.63 (1.14)	<0.001	79	53	-0.14 (1.51)	0.60 (1.55)	<0.001
Friends mainly older	No	87	76	-0.01 (1.15)	0.51 (1.14)	<0.001	82	54	-0.12 (1.50)	0.68 (1.61)	<0.001
	Yes	13	24	-0.30 (1.22)	0.38 (1.08)	0.021	18	45	-0.20 (1.70)	0.64 (1.42)	<0.001
Friends mainly younger	No	90	87	-0.02 (1.15)	0.51 (1.13)	<0.001	92	93	-0.15 (1.54)	0.69 (1.51)	<0.001
	Yes	10	13	-0.37 (1.24)	0.30 (1.04)	0.084	7	6	-0.04 (1.47)	0.22 (1.75)	0.504
<b>ROMANTIC RELATIONSHIPS</b>											
Relationship status	Single/casual	94	81	-0.02 (1.16)	0.43 (1.08)	0.001	96	49	-0.12 (1.54)	0.62 (1.57)	<0.001
	Committed relationship/engaged	4	15	-0.57 (1.22)	0.72 (1.24)	0.010	3	51	-0.26 (1.38)	0.72 (1.47)	0.006
Current relationship status/duration	Casual partners/single	83	61	0.01 (1.16)	0.36 (1.06)	0.024	84	28	-0.17 (1.51)	0.71 (1.55)	<0.001
	Time with partner < 1 year	11	27	-0.51 (1.14)	0.71 (1.23)	<0.001	13	43	0.10 (1.74)	0.76 (1.43)	0.002
	Time with partner ≥1 year	2	8	0.42 (1.02)	0.54 (0.95)	0.795	2	28	-0.18 (0.78)	0.50 (1.64)	<0.001

APPENDIX C  
Results relating to application of the "Adolescent Attitudes to Abortion Scale"

Table C.1 continued...

		MALES					FEMALES				
		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=326	SA <sup>Δ</sup> n=111	p	% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=590	SA <sup>Δ</sup> n=443	p
Total n=1470											
				Mean (SD)	Mean (SD)				Mean (SD)	Mean (SD)	
Age of partner (note missing cases)	≤13	3	3	-0.74 (1.31)	0.75 (1.22)	0.113	1	1	-0.21 (1.37)	0.60 (0.70)	0.313
	14-15	10	25	-0.28 (1.13)	0.48 (1.02)	0.008	9	9	-0.19 (1.48)	0.51 (1.66)	0.038
	≥16	1	6	-0.21 (0.25)	1.10 (1.46)	0.266	5	61	0.36 (1.90)	0.66 (1.50)	0.306
<b>SEXUAL BEHAVIOUR</b>											
Sexual attraction	Heterosexual	96	94	-0.05 (1.17)	0.53 (1.11)	<0.001	88	86	-0.13 (1.55)	0.67 (1.54)	<0.001
	Bi- or homosexual	1	5	1.10 (1.87)	0.01 (0.89)	0.311	3	10	0.54 (1.73)	1.06 (1.24)	0.194
	Not sure	-	-	-	-		7	3	-0.50 (1.30)	-0.15 (1.33)	0.401
Age of onset of kissing	≤13	33	71	0.06 (1.20)	0.62 (1.10)	0.001	23	59	0.10 (1.50)	0.64 (1.48)	0.001
	14-15	13	21	-0.23 (1.23)	0.32 (1.18)	0.088	15	34	0.04 (1.55)	0.62 (1.61)	0.006
	≥16	1	1	-0.41 (0.54)	-0.23 (0.00)	0.828	1	7	0.34 (2.54)	1.10 (1.52)	0.288
Age of onset of genital touching	≤13	11	47	0.43 (1.12)	0.50 (1.18)	0.765	5	27	-0.01 (1.41)	0.76 (1.46)	0.010
	14-15	7	36	-0.28 (1.12)	0.55 (1.16)	0.007	9	57	0.15 (1.64)	0.62 (1.51)	0.038
	≥16	1	2	-0.04 (0.03)	0.43 (0.92)	0.546	1	13	-0.30 (1.95)	0.89 (1.57)	0.115
<b>PREGNANCY</b>											
Would like to become a parent soon	Yes	5	13	0.39 (0.81)	-0.19 (0.82)	0.066	7	16	-0.31 (1.44)	0.07 (1.31)	0.153
	No	81	75	-0.05 (1.20)	0.67 (1.16)	<0.001	84	64	-0.08 (1.57)	1.09 (1.47)	<0.001

APPENDIX C  
Results relating to application of the “Adolescent Attitudes to Abortion Scale”

**Table C.2**

**Rasch Mean AAA Scale Locations (Comparisons by Duration of Sexual Activity within Gender)**

<sup>Δ</sup>SA = sexually active (vaginal intercourse), data relating to the age at sexual debut was missing for 51 males and 66 females

Note: % do not sum to 100% if missing data

		MALES					FEMALES				
		% <sup>Δ</sup> <sub>SA</sub> <1yr	% <sup>Δ</sup> <sub>SA</sub> ≥1yr	SA <sup>Δ</sup> <1yr	SA <sup>Δ</sup> ≥1yr	p	% <sup>Δ</sup> <sub>SA</sub> <1yr	% <sup>Δ</sup> <sub>SA</sub> ≥1yr	SA <sup>Δ</sup> <1yr	SA <sup>Δ</sup> ≥1yr	p
<b>Total n=427</b>				n=31	n=29			r	n=90	n=277	
All				Mean (SD) 0.43 (1.12)	Mean (SD) 0.70 (1.33)	0.398			Mean (SD) 0.96 (1.42)	Mean (SD) 0.69 (1.53)	0.140
<b>GENERAL</b>											
Age	≤15	81	69	0.45 (1.13)	0.69 (1.24)	0.505	47	17	0.54 (1.28)	0.57 (1.48)	0.904
	≥16	3 (n=1)	31	-0.23 (n=1)	0.72 (1.60)	0.310	47	83	1.37 (1.49)	0.71 (1.55)	0.011
ATSI	No	100	79	0.43 (1.12)	0.86 (1.44)	0.217	96	92	0.95 (1.44)	0.79 (1.45)	0.365
	Yes	-	21	-	0.07 (0.47)		4	8	0.98 (0.65)	-0.54 (1.98)	0.148
English spoken at home	No	-	-	-	-	-	1	-	0.65	-	-
	Yes	100	100	0.43 (1.12)	0.70 (1.33)	0.725	99	100	0.98 (1.41)	0.68 (1.53)	0.107
Religious affiliation	None	58	52	0.51 (1.35)	0.85 (1.42)	0.492	44	60	1.25 (1.37)	0.62 (1.56)	0.020
	Christianity	32	34	0.31 (0.69)	0.55 (1.23)	0.596	53	37	0.74 (1.45)	0.72 (1.49)	0.920
	Other	10	14	0.35 (0.99)	0.52 (1.54)	0.870	2	3	0.17 (0.58)	1.52 (1.54)	0.271
<b>FAMILY BACKGROUND</b>											
Mother working	No	19	14	-0.11 (0.68)	-0.55 (0.66)	0.343	22	30	0.90 (1.58)	0.44 (1.75)	0.281
	Yes	74	72	0.55 (1.21)	0.96 (1.40)	0.307	73	60	1.03 (1.40)	0.90 (1.35)	0.508
Father working	No	-	17	-	0.66	-	4	11	0.37 (0.89)	0.71 (1.81)	0.713
	Yes	90	62	0.49 (1.16)	0.67 (1.47)	0.647	81	68	1.11 (1.39)	0.85 (1.42)	0.166
Mother's highest education level	Unsure	26	21	0.48 (0.85)	0.94 (1.42)	0.467	17	14	0.71 (1.25)	0.42 (1.36)	0.481
	Some school	19	14	-0.34 (1.04)	-0.06 (1.08)	0.700	22	29	0.95 (1.31)	0.42 (1.85)	0.226
	TAFE/trade/completed high school	35	38	0.74 (1.34)	0.66 (1.65)	0.907	42	38	0.91 (1.50)	0.97 (1.28)	0.812
	University	19	28	0.56 (0.90)	0.95 (0.89)	0.435	17	13	1.39 (1.61)	1.02 (1.35)	0.405
Father's highest education level	Unsure	29	10	0.72 (1.07)	0.35 (0.63)	0.586	17	19	1.03 (1.15)	0.11 (1.46)	0.028
	Some school	16	24	0.18 (1.36)	0.67 (1.75)	0.612	22	22	0.92 (1.25)	0.48 (1.69)	0.288
	TAFE/trade/completed high school	32	38	0.04 (1.08)	0.64 (1.61)	0.329	36	31	0.72 (1.26)	1.01 (1.29)	0.285

APPENDIX C  
Results relating to application of the "Adolescent Attitudes to Abortion Scale"

Table C.2 continued...

		MALES					FEMALES				
		% <sub>SA</sub> <sup>Δ</sup> <sub>&lt;1yr</sub>	% <sub>SA</sub> <sup>Δ</sup> <sub>1yr</sub>	SA <sup>Δ</sup> <sub>&lt;1yr</sub>	SA <sup>Δ</sup> <sub>≥1yr</sub>	p	% <sub>SA</sub> <sup>Δ</sup> <sub>1yr</sub>	% <sub>SA</sub> <sup>Δ</sup> <sub>≥1yr</sub>	SA <sup>Δ</sup> <sub>&lt;1yr</sub>	SA <sup>Δ</sup> <sub>≥1yr</sub>	p
Total n=427				n=31	n=29			r	n=90	n=277	
				Mean (SD)	Mean (SD)				Mean (SD)	Mean (SD)	
University		23	21	0.79 (1.07)	1.13 (0.77)	0.537	18	14	1.73 (1.72)	1.19 (1.35)	0.221
<b>ALCOHOL AND/OR OTHER DRUG USE</b>											
Mother smoked ever	No	81	55	0.44 (1.15)	0.98 (1.42)	0.184	61	50	0.97 (1.35)	0.91 (1.57)	0.811
	Yes	19	45	0.39 (1.07)	0.35 (1.18)	0.944	38	45	0.95 (1.55)	0.52 (1.44)	0.134
Father smoked ever	No	81	59	0.46 (1.14)	0.92 (1.43)	0.261	54	43	1.08 (1.40)	0.96 (1.38)	0.606
	Yes	19	31	0.29 (1.09)	0.37 (1.36)	0.908	37	43	0.99 (1.30)	0.42 (1.55)	0.053
Mother drinks alcohol	No/occasional	87	90	0.31 (1.04)	0.72 (1.36)	0.215	84	74	0.96 (1.46)	0.63 (1.55)	0.106
	Yes	13	10	1.26 (1.42)	0.50 (1.31)	0.501	14	21	0.98 (1.27)	1.11 (1.42)	0.772
Father drinks alcohol	No/occasional	71	72	0.34 (1.16)	0.37 (1.21)	0.932	66	52	1.03 (1.34)	0.68 (1.46)	0.109
	Yes	29	17	0.65 (1.03)	2.22 (1.25)	0.026	27	35	0.99 (1.46)	0.77 (1.52)	0.516
Ever smoked	No	61	28	0.27 (0.99)	1.23 (1.49)	0.059	39	15	0.98 (1.51)	0.56 (1.71)	0.262
	Yes	39	69	0.69 (1.30)	0.56 (1.25)	0.774	61	84	0.94 (1.37)	0.70 (1.51)	0.296
Ever drunk alcohol	No	6	10	0.36 (0.82)	0.49 (1.60)	0.922	3	2	-0.63 (0.35)	0.30 (2.10)	0.488
	Yes	90	86	0.48 (1.14)	0.78 (1.33)	0.384	96	97	1.01 (1.42)	0.69 (1.54)	0.090
Ever used illicit drugs	No	81	83	0.37 (1.11)	0.77 (1.43)	0.287	71	51	0.93 (1.56)	0.37 (1.51)	0.016
	Yes	19	17	0.67 (1.23)	0.38 (0.77)	0.670	29	49	1.02 (1.00)	1.02 (1.49)	0.988
Alcohol/drug problems in family	No	81	72	0.53 (1.16)	0.98 (1.41)	0.245	73	54	0.97 (1.43)	0.67 (1.40)	0.152
	Yes	19	28	0.02 (0.87)	-0.02 (0.79)	0.928	27	45	0.91 (1.40)	0.73 (1.69)	0.632
Alcohol/drug problems with close friend or boy/girlfriend	No	61	62	0.32 (0.94)	0.92 (1.37)	0.128	59	45	0.78 (1.40)	0.68 (1.51)	0.697
	Yes	35	38	0.75 (1.34)	0.34 (1.24)	0.462	41	55	1.21 (1.42)	0.71 (1.56)	0.074
Parents would find out if drank alcohol	No	52	55	0.42 (1.06)	0.48 (1.18)	0.879	52	56	1.00 (1.53)	0.80 (1.48)	0.428
	Yes	48	41	0.44 (1.21)	0.73 (1.28)	0.554	40	31	0.98 (1.33)	0.54 (1.54)	0.132
<b>FAMILY FUNCTIONING</b>											

APPENDIX C  
Results relating to application of the “Adolescent Attitudes to Abortion Scale”

Table C.2 continued...

		MALES					FEMALES				
		% <sub>SA</sub> <sup>Δ</sup> <sub>&lt;1yr</sub>	% <sub>SA</sub> <sup>Δ</sup> <sub>1yr</sub>	SA <sup>Δ</sup> <sub>&lt;1yr</sub>	SA <sup>Δ</sup> <sub>≥1yr</sub>	p	% <sub>SA</sub> <sup>Δ</sup> <sub>1yr</sub>	% <sub>SA</sub> <sup>Δ</sup> <sub>≥1yr</sub>	SA <sup>Δ</sup> <sub>&lt;1yr</sub>	SA <sup>Δ</sup> <sub>≥1yr</sub>	p
Total n=427				n=31	n=29			r	n=90	n=277	
				Mean (SD)	Mean (SD)				Mean (SD)	Mean (SD)	
Lives with both parents	No	32	45	0.27 (1.03)	0.24 (1.11)	0.940	53	70	1.00 (1.35)	0.53 (1.57)	0.055
	Yes	68	55	0.50 (1.17)	1.07 (1.41)	0.188	47	30	0.90 (1.50)	1.04 (1.39)	0.589
Family supportive	No	3	7	0.23 (n=1)	0.51 (0.80)	0.593	7	5	1.19 (0.74)	0.88 (0.92)	0.478
	Yes	90	93	0.48 (1.16)	0.71 (1.37)	0.501	84	86	0.86 (1.43)	0.65 (1.58)	0.302
Ask parents for help with personal problems	No	29	21	0.58 (0.63)	1.15 (1.62)	0.354	30	20	0.88 (1.24)	0.73 (1.58)	0.675
	Yes	68	79	0.44 (1.26)	0.58 (1.26)	0.701	69	76	1.00 (1.50)	0.64 (1.52)	0.104
Family rules are clear	No	23	10	0.59 (1.21)	0.27 (1.09)	0.703	21	31	1.15 (1.39)	0.49 (1.64)	0.108
	Yes	77	90	0.38 (1.11)	0.75 (1.37)	0.306	79	69	0.90 (1.43)	0.77 (1.48)	0.525
Parents control everything	No	52	55	0.42 (1.06)	0.48 (1.18)	0.879	49	66	0.94 (1.57)	0.71 (1.55)	0.371
	Yes	48	41	0.44 (1.21)	0.73 (1.28)	0.554	48	26	1.00 (1.30)	0.92 (1.42)	0.767
Parents ask my thoughts before family decisions affecting me are made	No	39	28	0.27 (1.04)	0.79 (1.40)	0.352	40	31	0.74 (1.37)	0.71 (1.42)	0.904
	Yes	58	72	0.48 (1.19)	0.67 (1.34)	0.651	59	64	1.10 (1.45)	0.77 (1.53)	0.155
Parents overprotect	No	58	72	0.20 (1.23)	0.52 (1.09)	0.402	63	74	1.05 (1.54)	0.73 (1.49)	0.158
	Yes	39	28	0.80 (0.89)	1.18 (1.83)	0.543	30	21	0.96 (1.23)	0.70 (1.61)	0.466
<b>NEIGHBOURHOOD</b>											
Number of homes lived in since birth	1-3	52	31	0.04 (0.90)	1.30 (1.27)	0.008	46	33	0.87 (1.33)	1.16 (1.39)	0.259
	≥4	48	62	0.85 (1.20)	0.14 (0.96)	0.070	53	65	1.03 (1.51)	0.44 (1.56)	0.020
Years at current address	≤1 year	6	10	0.22 (0.63)	0.08 (1.07)	0.882	23	38	0.90 (1.42)	0.51 (1.56)	0.291
	>1 year	90	90	0.47 (1.16)	0.77 (1.36)	0.382	74	60	0.97 (1.41)	0.78 (1.54)	0.409
	<1 year	6	10	0.22 (0.63)	0.08 (1.07)	0.882	21	34	0.86 (1.45)	0.53 (1.52)	0.381
	1-5 years	29	48	0.98 (1.38)	0.56 (1.37)	0.487	38	34	1.02 (1.27)	0.64 (1.60)	0.210
	>5 years	61	41	0.23 (0.99)	1.02 (1.36)	0.071	39	31	0.93 (1.53)	0.89 (1.50)	0.909
Safe neighbourhood	Disagree/unsure	23	17	0.48 (1.28)	0.64 (1.97)	0.031	27	26	1.23 (1.58)	0.48 (1.78)	0.070
	Agree	77	83	0.42 (1.10)	0.71 (1.22)	0.779	73	73	0.86 (1.35)	0.75 (1.44)	0.591



APPENDIX C  
Results relating to application of the “Adolescent Attitudes to Abortion Scale”

Table C.2 continued...

		MALES					FEMALES					
		% <sub>SA</sub> <sup>Δ</sup> <sub>&lt;1yr</sub>	% <sub>SA</sub> <sup>Δ</sup> <sub>1yr</sub>	SA <sup>Δ</sup> <sub>&lt;1yr</sub>	SA <sup>Δ</sup> <sub>≥1yr</sub>	p	% <sub>SA</sub> <sup>Δ</sup> <sub>1yr</sub>	% <sub>SA</sub> <sup>Δ</sup> <sub>≥1yr</sub>	SA <sup>Δ</sup> <sub>&lt;1yr</sub>	SA <sup>Δ</sup> <sub>≥1yr</sub>	p	
Total n=427				n=31	n=29			r	n=90	n=277		
				Mean (SD)	Mean (SD)				Mean (SD)	Mean (SD)		
Clean neighbourhood	Disagree/unsure	19	21	0.48 (1.17)	1.00 (2.14)	0.271		18	24	1.51 (1.60)	0.40 (1.84)	0.030
	Agree	77	79	0.48 (1.11)	0.62 (1.09)	0.197		81	75	0.84 (1.37)	0.77 (1.42)	0.703
Theft/vandalism in neighbourhood	No/unsure	29	34	0.33 (0.56)	0.80 (1.27)	0.321		23	20	1.31 (1.63)	0.69 (1.75)	0.166
	Yes	71	66	0.47 (1.29)	0.64 (1.40)	0.677		77	79	0.85 (1.34)	0.68 (1.48)	0.393
Violence (any) in neighbourhood	No/unsure	71	48	0.41 (1.17)	0.91 (1.41)	0.259		47	44	1.05 (1.39)	0.83 (1.49)	0.412
	Yes	29	52	0.49 (1.04)	0.51 (1.27)	0.967		53	55	0.87 (1.45)	0.56 (1.57)	0.220
Domestic violence in neighbourhood	No/unsure	77	69	0.44 (1.15)	0.81 (1.36)	0.337		64	57	1.11 (1.46)	0.76 (1.48)	0.131
	Yes	23	31	0.39 (1.10)	0.46 (1.30)	0.915		36	41	0.68 (1.31)	0.57 (1.62)	0.713
Participated in sport/recreation activities during last 12 months	No	10	24	0.07 (0.30)	0.57 (1.41)	0.574		41	55	0.90 (1.52)	0.56 (1.55)	0.230
	Yes	90	76	0.47 (1.17)	0.74 (1.34)	0.444		59	44	0.99 (1.36)	0.83 (1.51)	0.508
Participated in youth group activities during last 12 months	No	68	69	0.51 (1.17)	0.56 (1.23)	0.898		71	83	0.98 (1.36)	0.80 (1.45)	0.372
	Yes	32	31	0.25 (1.03)	1.00 (1.57)	0.230		28	16	0.96 (1.56)	0.09 (1.80)	0.047
SCHOOL												
Ever repeated a year at school	No	90	90	0.42 (1.17)	0.86 (1.29)	0.197		94	87	0.98 (1.43)	0.69 (1.55)	0.134
	Yes	10	10	0.48 (0.54)	-0.71 (0.83)	0.108		4	11	0.57 (1.27)	0.69 (1.45)	0.881
Ever skipped school	No	68	52	0.43 (1.15)	0.74 (1.50)	0.489		41	18	0.80 (1.49)	0.76 (1.58)	0.897
	Yes	29	48	0.70 (0.77)	0.66 (1.19)	0.937		36	23	1.00 (1.44)	0.69 (1.56)	0.344
PSYCHOLOGICAL SCALES												
Low personal self-efficacy <sup>*</sup>	Normal	45	52	0.44 (1.23)	0.59 (1.14)	0.743		37	37	0.95 (1.28)	0.84 (1.57)	0.722
	Borderline/Abnormal	36	35	0.58 (0.82)	0.88 (1.80)	0.633		44	42	0.94 (1.20)	0.74 (1.48)	0.436
Low self-esteem <sup>†</sup>	No	90	76	0.50 (1.15)	0.80 (1.36)	0.412		69	70	1.03 (1.54)	0.72 (1.55)	0.175

<sup>\*</sup> Score derived from Cowen's Personal Self-Efficacy Scale (Cowen, et al., 1991).

<sup>†</sup> Score derived from Rosenberg's Self-Esteem Scale (Rosenberg, 1989).

APPENDIX C  
Results relating to application of the “Adolescent Attitudes to Abortion Scale”

Table C.2 continued...

		MALES					FEMALES				
		% <sub>SA</sub> <sup>Δ</sup> <1yr	% <sub>SA</sub> <sup>Δ</sup> 1yr	SA <sup>Δ</sup> <1yr	SA <sup>Δ</sup> ≥1yr	p	% <sub>SA</sub> <sup>Δ</sup> 1yr	% <sub>SA</sub> <sup>Δ</sup> ≥1yr	SA <sup>Δ</sup> <1yr	SA <sup>Δ</sup> ≥1yr	p
Total n=427				n=31	n=29			r	n=90	n=277	
				Mean (SD)	Mean (SD)				Mean (SD)	Mean (SD)	
SDQ Emotional difficulties <sup>‡</sup>	Yes	6	14	-0.39 (0.23)	0.27 (1.40)	0.569	24	21	0.74 (0.85)	0.73 (1.52)	0.990
	Normal	87	93	0.45 (1.12)	0.73 (1.36)	0.405	74	70	1.05 (1.52)	0.68 (1.55)	0.091
	Borderline/abnormal	10	7	0.41 (1.53)	0.29 (1.12)	0.929	24	30	0.63 (1.04)	0.72 (1.51)	0.786
SDQ Conduct problems <sup>‡</sup>	Normal	52	59	0.24 (1.13)	0.77 (1.53)	0.271	67	68	0.85 (1.39)	0.67 (1.60)	0.434
	Borderline/abnormal	45	41	0.67 (1.14)	0.60 (1.05)	0.874	32	32	1.15 (1.49)	0.74 (1.39)	0.186
SDQ Hyperactivity <sup>‡</sup>	Normal	55	59	0.35 (1.31)	0.59 (1.02)	0.567	62	61	0.94 (1.59)	0.62 (1.55)	0.179
	Borderline/abnormal	42	41	0.56 (0.89)	0.86 (1.72)	0.583	37	38	0.95 (1.11)	0.81 (1.50)	0.620
SDQ Peer problems <sup>‡</sup>	Normal	74	79	0.49 (1.15)	0.69 (1.34)	0.586	79	73	1.04 (1.41)	0.80 (1.54)	0.242
	Borderline/abnormal	23	21	0.29 (1.15)	0.73 (1.44)	0.548	20	27	0.57 (1.44)	0.41 (1.47)	0.687
SDQ Prosocial scale <sup>‡</sup>	Normal	58	76	0.39 (1.11)	0.68 (1.37)	0.471	87	84	0.88 (1.37)	0.67 (1.53)	0.290
	Borderline/abnormal	39	24	0.53 (1.21)	0.77 (1.30)	0.688	12	15	1.42 (1.75)	0.81 (1.56)	0.261
SDQ Total difficulties <sup>‡</sup>	Normal	58	66	0.41 (1.25)	0.62 (1.31)	0.626	64	58	1.09 (1.58)	0.69 (1.57)	0.101
	Borderline/abnormal	39	34	0.48 (0.99)	0.85 (1.43)	0.490	34	41	0.68 (1.04)	0.69 (1.48)	0.957
<b>FRIENDSHIPS</b>											
Experienced negative treatment by others	No	-	3	-	2.15 (n=1)	-	1	1	1.01 (n=1)	0.50 (1.01)	0.663
	Yes	100	97	0.65 (1.33)	0.53 (1.21)	0.496	98	99	0.94 (1.43)	0.69 (1.54)	0.167
Any close friends	No	-	3	-	-0.06 (n=1)	-	1	2	0.50 (n=1)	0.86 (1.69)	0.852
	Yes	100	97	0.43 (1.12)	0.73 (1.35)	0.359	99	96	0.96 (1.42)	0.67 (1.54)	0.122
Importance of friendships	Less	6	17	0.45 (0.95)	0.66 (1.81)	0.022	8	25	1.92 (1.54)	0.11 (1.72)	0.009
	More	94	83	0.43 (1.14)	0.71 (1.26)	0.717	91	74	0.87 (1.39)	0.88 (1.43)	0.993
Friends mainly from school	No	19	24	0.96 (1.40)	-0.07 (1.00)	0.152	22	44	0.98 (1.34)	0.79 (1.50)	0.583
	Yes	81	76	0.30 (1.03)	0.94 (1.35)	0.072	78	55	0.95 (1.45)	0.59 (1.57)	0.112

<sup>‡</sup> Score and sub-scales derived from Strengths and Difficulties Questionnaire (Goodman, 1999).

APPENDIX C  
Results relating to application of the "Adolescent Attitudes to Abortion Scale"

Table C.2 continued...

		MALES					FEMALES				
		% <sup>Δ</sup> <sub>SA &lt;1yr</sub>	% <sup>Δ</sup> <sub>SA ≥1yr</sub>	SA <sup>Δ</sup> <1yr	SA <sup>Δ</sup> ≥1yr	p	% <sup>Δ</sup> <sub>SA &lt;1yr</sub>	% <sup>Δ</sup> <sub>SA ≥1yr</sub>	SA <sup>Δ</sup> <1yr	SA <sup>Δ</sup> ≥1yr	p
Total n=427				n=31	n=29			r	n=90	n=277	
				Mean (SD)	Mean (SD)				Mean (SD)	Mean (SD)	
Friends of both sexes	No	29	21	0.30 (0.87)	0.99 (1.44)	0.265	24	23	0.92 (1.24)	0.54 (1.71)	0.338
	Yes	71	79	0.48 (1.22)	0.62 (1.33)	0.713	76	75	0.97 (1.48)	0.72 (1.48)	0.241
Friends mainly of same sex	No	71	79	0.41 (1.20)	0.51 (1.29)	0.797	74	80	0.99 (1.32)	0.69 (1.53)	0.148
	Yes	29	21	0.48 (0.93)	1.44 (1.33)	0.122	26	19	0.85 (1.69)	0.63 (1.60)	0.588
Friends mainly of opposite sex	No	74	90	0.49 (1.12)	0.61 (1.31)	0.739	80	74	1.05 (1.44)	0.67 (1.59)	0.079
	Yes	26	10	0.25 (1.16)	1.48 (1.51)	0.179	20	25	0.58 (1.31)	0.69 (1.39)	0.748
Friends mainly of same age	No	45	28	0.20 (0.92)	0.08 (0.91)	0.782	44	49	1.16 (1.50)	0.73 (1.46)	0.106
	Yes	55	72	0.62 (1.25)	0.94 (1.41)	0.481	56	50	0.79 (1.34)	0.63 (1.62)	0.526
Friends mainly older	No	71	76	0.33 (1.16)	0.79 (1.26)	0.214	56	48	1.17 (1.43)	0.73 (1.61)	0.088
	Yes	29	24	0.67 (1.02)	0.41 (1.62)	0.699	44	51	0.68 (1.37)	0.63 (1.47)	0.853
Friends mainly younger	No	81	93	0.37 (1.12)	0.74 (1.33)	0.282	94	93	0.93 (1.40)	0.72 (1.52)	0.270
	Yes	19	7	0.70 (1.16)	0.17 (1.68)	0.623	6	6	1.43 (1.71)	0.06 (1.71)	0.130
<b>ROMANTIC RELATIONSHIPS</b>											
Relationship status	Single/casual	77	83	0.55 (1.19)	0.41 (1.11)	0.673	48	42	1.21 (1.45)	0.57 (1.57)	0.021
	Committed relationship/engaged	23	10	0.02 (0.77)	2.79 (1.29)	0.002	52	58	0.72 (1.35)	0.77 (1.51)	0.850
Current relationship status/duration	Casual partners/single	52	69	0.52 (1.01)	0.48 (1.20)	0.912	22	25	1.52 (1.56)	0.55 (1.59)	0.018
	Time with partner < 1 year	32	24	0.22 (1.21)	1.35 (1.70)	0.127	54	39	0.83 (1.10)	0.96 (1.38)	0.549
	Time with partner ≥1 years	13	3	0.05 (0.99)	1.35 (n=1)	0.327	23	35	0.71 (1.82)	0.47 (1.63)	0.553
Age of partner (note missing cases)	≤15	32	21	-0.12 (0.76)	0.94 (1.42)	0.070	17	3	1.06 (1.29)	0.42 (1.55)	0.307
	≥16	10	7	0.24 (1.16)	2.60 (1.77)	0.161	59	71	0.72 (1.38)	0.73 (1.51)	0.994
<b>SEXUAL BEHAVIOUR</b>											
Sexual attraction	Heterosexual	90	100	0.52 (1.12)	0.70 (1.33)	0.581	90	84	0.99 (1.45)	0.67 (1.53)	0.100
	Bi- or homosexual	10	-	-0.40 (0.87)	-	-	7	13	1.19 (0.70)	1.05 (1.36)	0.806

APPENDIX C  
Results relating to application of the "Adolescent Attitudes to Abortion Scale"

Table C.2 continued...

	MALES						FEMALES				
	% <sup>Δ</sup> <sub>SA &lt;1yr</sub>	% <sup>Δ</sup> <sub>SA ≥1yr</sub>	SA <sup>Δ</sup> <1yr	SA <sup>Δ</sup> ≥1yr	p		% <sup>Δ</sup> <sub>SA &lt;1yr</sub>	% <sup>Δ</sup> <sub>SA ≥1yr</sub>	SA <sup>Δ</sup> <1yr	SA <sup>Δ</sup> ≥1yr	p
<b>Total n=427</b>			n=31	n=29				r	n=90	n=277	
			Mean (SD)	Mean (SD)					Mean (SD)	Mean (SD)	
	Not sure	-	-	-	-		2	3	-0.46 (0.64)	-0.05 (1.68)	0.751
Age of onset of kissing	≤13	65	79	0.70 (1.23)	0.74 (1.30)	0.910	56	55	0.98 (1.55)	0.68 (1.44)	0.202
	14-15	29	14	0.01 (0.74)	0.76 (1.99)	0.330	31	38	0.90 (1.22)	0.61 (1.66)	0.385
	≥16	3	-	-0.23 (n=1)			13	7	0.95 (1.37)	1.19 (1.63)	0.685
Age of onset of genital touching	≤15	94	93	0.49 (1.13)	0.75 (1.37)	0.442	87	92	0.96 (1.43)	0.65 (1.53)	0.119
	≥16	3	-	-0.23 (n=1)	-	-	13	7	0.95 (1.37)	1.19 (1.63)	0.685
Age of onset of sexual activity- oral sex	≤13	55	62	0.61 (1.29)	0.59 (1.23)	0.965	21	28	0.98 (1.52)	0.79 (1.42)	0.604
	14-15	29	31	0.28 (1.02)	0.93 (1.68)	0.332	52	58	0.93 (1.28)	0.62 (1.56)	0.222
	≥16	3	3	-0.23 (n=1)	1.08 (n=1)	-	22	13	0.97 (1.58)	0.92 (1.56)	0.905
Age of onset of sexual activity - oral sex	≤15	84	93	0.49 (1.19)	0.70 (1.38)	0.555	73	86	0.94 (1.34)	0.68 (1.52)	0.197
	≥16	3	3	-0.23 (n=1)	1.08 (n=1)	-	22	13	0.97 (1.58)	0.92 (1.56)	0.905
Age of onset of sexual activity - vaginal sex	≤13	23	38	0.76 (0.76)	0.54 (1.44)	0.715	7	10	0.81 (1.08)	0.67 (1.25)	0.795
	14-15	52	34	0.23 (1.25)	0.46 (1.05)	0.635	43	52	0.75 (1.39)	0.67 (1.56)	0.777
	≥16	-	3	-	1.08 (n=1)	-	36	27	1.40 (1.46)	0.95 (1.59)	0.175
Age of onset of sexual activity - vaginal sex	≤15	74	72	0.39 (1.13)	0.50 (1.24)	0.759	50	62	0.76 (1.34)	0.67 (1.51)	0.726
	≥16	-	3	-	1.08 (n=1)	-	36	27	1.40 (1.46)	0.95 (1.59)	0.175
Age of onset of sexual activity - anal sex	≤13	16	48	0.74 (0.76)	0.71 (1.31)	0.969	7	17	0.94 (1.00)	0.43 (1.28)	0.355
	14-15	81	48	0.39 (1.19)	0.64 (1.44)	0.571	47	63	0.54 (1.28)	0.62 (1.62)	0.757
	≥16	3	3	-0.23 (n=1)	1.35 (n=1)	-	47	20	1.37 (1.49)	1.09 (1.39)	0.337
Age of onset of sexual activity - anal sex	≤15	97	97	0.45 (1.13)	0.68 (1.35)	0.494	53	80	0.59 (1.25)	0.58 (1.55)	0.974
	≥16	3	3	-0.23 (n=1)	1.35 (n=1)	-	47	20	1.37 (1.49)	1.09 (1.39)	0.337
Age of onset of sexual activity - anal sex	≤13	6	14	0.51 (1.03)	0.38 (0.69)	0.863	2	1	0.67 (0.61)	0.39 (1.17)	0.785
	14-15	29	21	-0.15 (0.86)	0.22 (1.88)	0.612	3	12	0.31 (0.28)	0.01 (1.23)	0.676
	≥16		3	-	1.35 (n=1)	-	8	17	1.12 (1.69)	1.20 (1.38)	0.882

APPENDIX C  
Results relating to application of the "Adolescent Attitudes to Abortion Scale"

Table C.2 continued...

MALES						FEMALES					
		% <sup>Δ</sup> <sub>SA</sub> <1yr	% <sup>Δ</sup> <sub>SA</sub> ≥1yr	SA <sup>Δ</sup> <1yr	SA <sup>Δ</sup> ≥1yr	p			% <sup>Δ</sup> <sub>SA</sub> <1yr	% <sup>Δ</sup> <sub>SA</sub> ≥1yr	p
Total n=427				n=31	n=29				n=90	n=277	
				Mean (SD)	Mean (SD)				Mean (SD)	Mean (SD)	
Age at sexual debut (oral/vaginal/anal sex)	≤15	-	-	-0.03 (0.87)	0.28 (1.46)	0.552	6	13	0.45 (0.41)	0.04 (1.21)	0.456
	≥16	-	3	-	1.35 (n=1)	-	8	17	1.12 (1.69)	1.20 (1.38)	0.882
	≤13	29	52	0.61 (0.74)	0.62 (1.31)	0.975	10	20	0.83 (0.96)	0.56 (1.49)	0.609
	14-15	68	48	0.38 (1.27)	0.78 (1.40)	0.392	51	64	0.75 (1.40)	0.62 (1.56)	0.621
	≥16	3	-	-0.23 (n=1)	-	-	39	16	1.26 (1.50)	1.10 (1.47)	0.645
	≤15	97	100	0.45 (1.13)	0.70 (1.33)	0.444	61	84	0.76 (1.33)	0.61 (1.54)	0.499
	≥16	3	-	-0.23 (n=1)	-	-	39	16	1.26 (1.50)	1.10 (1.47)	0.645
Number of oral sex partners in previous year	1	32	24	0.19 (1.13)	0.84 (1.44)	0.314	63	49	0.90 (1.50)	0.66 (1.50)	0.313
	2	23	10	0.58 (1.01)	1.10 (0.39)	0.430	13	17	0.89 (1.15)	0.60 (1.67)	0.559
	≥3	26	52	0.27 (1.12)	0.50 (1.27)	0.667	10	24	1.06 (1.46)	1.19 (1.41)	0.803
Number of people had oral sex but not intercourse with in last year	1	48	38	0.38 (1.14)	0.59 (1.47)	0.689	60	55	0.84 (1.28)	0.76 (1.50)	0.706
	2	13	14	0.34 (0.63)	0.51 (0.83)	0.753	12	13	0.96 (1.33)	0.67 (1.59)	0.576
	≥3	19	28	0.16 (1.23)	0.86 (1.32)	0.338	6	11	1.81 (1.52)	0.99 (1.55)	0.280
Number of people had vaginal intercourse with in last year	1	55	28	0.40 (1.03)	1.11 (1.22)	0.145	68	48	0.91 (1.49)	0.58 (1.58)	0.173
	2	13	14	1.34 (1.65)	1.11 (0.86)	0.813	12	18	1.04 (1.07)	0.69 (1.67)	0.510
	≥3	16	24	0.30 (1.05)	0.11 (0.44)	0.677	12	28	0.89 (1.44)	0.92 (1.43)	0.947
Number of people had any form of sexual intercourse with in last year	1	32	21	0.34 (1.27)	0.80 (1.58)	0.529	63	46	0.96 (1.56)	0.49 (1.53)	0.054
	2	29	14	0.81 (1.18)	1.09 (0.32)	0.650	22	18	0.97 (1.06)	0.53 (1.57)	0.252
	≥3	29	52	0.23 (1.05)	0.50 (1.27)	0.598	13	34	0.87 (1.37)	1.07 (1.48)	0.654
Ever had unwanted sex	No	68	55	0.61 (1.23)	0.82 (1.02)	0.598	70	53	0.85 (1.43)	0.56 (1.59)	0.217
	Yes	16	17	0.15 (0.63)	0.03 (0.90)	0.809	24	42	1.18 (1.42)	0.85 (1.51)	0.342
Reasons for unwanted sex	Drunk or high	6	3	0.07 (0.42)	-0.50 (n=1)	0.467	13	21	0.88 (1.06)	1.04 (1.58)	0.739
	Person I had sex with thought I should	6	14	0.73 (0.51)	-0.30 (0.60)	0.106	11	17	1.47 (1.55)	0.74 (1.29)	0.122

APPENDIX C  
Results relating to application of the "Adolescent Attitudes to Abortion Scale"

Table C.2 continued...

		MALES					FEMALES				
		% <sub>SA</sub> <sup>Δ</sup> <sub>&lt;1yr</sub>	% <sub>SA</sub> <sup>Δ</sup> <sub>1yr</sub>	SA <sup>Δ</sup> <sub>&lt;1yr</sub>	SA <sup>Δ</sup> <sub>≥1yr</sub>	p	% <sub>SA</sub> <sup>Δ</sup> <sub>1yr</sub>	% <sub>SA</sub> <sup>Δ</sup> <sub>≥1yr</sub>	SA <sup>Δ</sup> <sub>&lt;1yr</sub>	SA <sup>Δ</sup> <sub>≥1yr</sub>	p
Total n=427				n=31	n=29			r	n=90	n=277	
				Mean (SD)	Mean (SD)				Mean (SD)	Mean (SD)	
Friends thought I should		-	6	-	-0.06 (0.62)	-	-	-	-	-	-
Drunk or high last time had sex	No	74	41	0.47 (1.14)	0.65 (1.18)	0.658	81	81	0.94 (1.59)	0.62 (1.50)	0.113
	Yes	6	28	0.70 (1.76)	0.61 (0.95)	0.922	13	14	0.93 (1.59)	1.21 (1.79)	0.630
Discussed avoiding pregnancy before last sexual encounter	No	48	48	0.53 (1.21)	0.66 (1.19)	0.777	52	65	1.11 (1.52)	0.61 (1.61)	0.059
	Yes	29	14	0.43 (1.18)	0.29 (0.79)	0.833	41	27	0.66 (1.25)	0.92 (1.41)	0.328
Condom use in previous 12 months	Always	68	41	0.70 (1.16)	0.80 (0.57)	0.767	41	17	0.87 (1.31)	0.73 (1.43)	0.636
	Sometimes	6	17	-0.06 (1.40)	0.07 (0.62)	0.866	40	62	0.87 (1.50)	0.70 (1.57)	0.549
	Never	10	7	-0.27 (0.48)	2.65 (0.71)	0.011	11	16	1.61 (1.65)	0.69 (1.67)	0.117
Ever used condoms	No	32	48	0.05 (0.82)	0.92 (1.80)	0.170	24	26	1.14 (1.31)	0.21 (1.42)	0.008
	Yes	68	52	0.61 (1.21)	0.49 (0.68)	0.741	76	74	0.89 (1.45)	0.85 (1.54)	0.849
Ever used oral contraceptives	No	90	86	0.31 (0.95)	0.57 (1.30)	0.398	76	58	0.91 (1.44)	0.62 (1.60)	0.202
	Yes	10	14	1.57 (2.07)	1.49 (1.43)	0.954	24	42	1.09 (1.37)	0.77 (1.43)	0.340
Ever used withdrawal/rhythm method	No	90	97	0.37 (1.13)	0.73 (1.34)	0.281	83	60	0.84 (1.26)	0.57 (1.55)	0.178
	Yes	10	3	0.98 (0.94)	-0.23 (n=1)	0.382	17	40	1.52 (1.98)	0.87 (1.49)	0.129
Ever used oral/anal sex to prevent pregnancy	No	81	86	0.49 (1.22)	0.73 (1.40)	0.534	91	79	0.95 (1.40)	0.67 (1.53)	0.158
	Yes	19	14	0.16 (0.52)	0.53 (0.89)	0.429	9	21	1.02 (1.65)	0.72 (1.55)	0.621
Ever used morning after pill	No	90	90	0.46 (1.16)	0.63 (1.39)	0.625	88	81	0.96 (1.44)	0.59 (1.56)	0.064
	Yes	10	10	0.16 (0.67)	1.31 (0.21)	0.048	12	19	0.91 (1.27)	1.10 (1.35)	0.671
Ever used Depo Provera/IUD/Implanon	No	97	93	0.48 (1.10)	0.72 (1.37)	0.466	97	91	0.98 (1.43)	0.70 (1.53)	0.132
	Yes	3	7	-1.05 (n=1)	0.43 (0.92)	0.416	3	9	0.29 (0.51)	0.57 (1.61)	0.769
Never used contraception	No	94	90	0.45 (1.15)	0.71 (1.33)	0.436	87	89	0.88 (1.39)	0.75 (1.53)	0.481

APPENDIX C  
Results relating to application of the "Adolescent Attitudes to Abortion Scale"

Table C.2 continued...

	MALES						FEMALES					
	% <sub>SA</sub> <sup>Δ</sup> <sub>&lt;1yr</sub>		% <sub>SA</sub> <sup>Δ</sup> <sub>1yr</sub>	SA <sup>Δ</sup> <sub>&lt;1yr</sub>	SA <sup>Δ</sup> <sub>≥1yr</sub>	p	% <sub>SA</sub> <sup>Δ</sup> <sub>1yr</sub>		% <sub>SA</sub> <sup>Δ</sup> <sub>≥1yr</sub>	SA <sup>Δ</sup> <sub>&lt;1yr</sub>	SA <sup>Δ</sup> <sub>≥1yr</sub>	p
									r			
Total n=427				n=31	n=29					n=90	n=277	
				Mean (SD)	Mean (SD)					Mean (SD)	Mean (SD)	
	Yes	6	10	0.17 (0.16)	0.60 (1.60)	0.744		13	11	1.41 (1.59)	0.18 (1.47)	0.022
PREGNANCY												
Would like to become a parent soon	Yes	23	14	-0.07 (0.93)	-0.62 (0.73)	0.342		4	17	0.21 (0.96)	0.07 (1.30)	0.470
	No	55	83	0.94 (1.31)	0.90 (1.22)	0.821		71	56	1.26 (1.41)	1.32 (1.36)	0.770

**Table C.3**  
**Rasch Mean AAA Scale Locations (Comparison by Termination History for Pregnant Females Only)**  
Note: % do not sum to 100% if missing data

				HISTORY OF TERMINATIONS		
		%No	%Yes	No n=253	Yes n=190	p
<b>Total n=443</b>						
All				Mean (SD) 0.15 (1.54)	Mean (SD) 1.36 (1.18)	<0.001
<b>GENERAL</b>						
Age	≤13	7	1	0.69 (0.93)	2.69 (n=1)	0.053
	14-15	45	11	0.28 (1.37)	1.37 (1.39)	0.001
	≥16	48	89	-0.05 (1.73)	1.35 (1.15)	<0.001
ATSI	No	25	98	-0.53 (1.43)	1.34 (1.16)	<0.001
	Yes	6	2	-1.61 (1.33)	2.77 (1.39)	<0.001
English spoken at home	No	1	1	-0.46 (0.64)	2.20 (n=1)	0.182
	Yes	99	99	0.15 (1.55)	1.35 (1.18)	<0.001
Religious affiliation	None	57	54	0.19 (1.43)	1.51 (1.17)	<0.001
	Christianity	40	44	0.02 (1.68)	1.15 (1.17)	<0.001
	Other	4	2	0.87 (1.59)	1.91 (1.10)	0.264
<b>FAMILY BACKGROUND</b>						
Mother working	No	28	24	0.11 (1.76)	1.34 (1.24)	<0.001
	Yes	63	68	0.24 (1.43)	1.40 (1.16)	<0.001
Father working	No	9	9	-0.12 (1.39)	1.48 (1.41)	0.001
	Yes	73	74	0.36 (1.52)	1.40 (1.18)	<0.001
Mother's highest education level	Unsure	18	13	0.21 (1.31)	1.07 (1.24)	0.010
	Some school	29	24	-0.13 (1.67)	1.42 (1.37)	<0.001
	TAFE/trade/completed high school	30	47	0.28 (1.38)	1.44 (1.01)	<0.001
	University	19	13	0.44 (1.70)	1.47 (1.26)	0.010
Father's highest education level	Unsure	24	13	0.08 (1.45)	1.02 (1.20)	0.005
	Some school	22	24	-0.03 (1.45)	1.24 (1.28)	<0.001
	TAFE/trade/completed high school	29	37	0.31 (1.37)	1.42 (1.02)	<0.001
	University	17	14	0.50 (1.83)	1.79 (1.28)	0.002
<b>ALCOHOL AND/OR OTHER DRUG USE</b>						
Mother smoked ever	No	60	52	0.29 (1.54)	1.53 (1.27)	<0.001
	Yes	36	46	0.00 (1.53)	1.20 (1.05)	<0.001
Father smoked ever	No	55	45	0.44 (1.53)	1.49 (1.13)	<0.001
	Yes	36	41	-0.14 (1.42)	1.19 (1.20)	<0.001
Mother drinks alcohol	No/occasional	75	77	0.09 (1.56)	1.33 (1.17)	<0.001
	Yes	20	19	0.43 (1.43)	1.60 (1.23)	<0.001
Father drinks alcohol	No/occasional	58	55	0.16 (1.56)	1.32 (1.07)	<0.001
	Yes	34	33	0.31 (1.39)	1.44 (1.33)	<0.001
Ever smoked	No	32	16	0.49 (1.60)	1.21 (1.42)	<0.001
	Yes	68	83	-0.02 (1.49)	1.39 (1.13)	<0.001
Ever drunk alcohol	No	2	1	-0.57 (0.78)	1.49 (3.17)	0.139
	Yes	95	98	0.15 (1.57)	1.36 (1.16)	<0.001
Ever used illicit drugs	No	68	51	0.08 (1.51)	1.25 (1.22)	<0.001



Table C.3 continued...

				HISTORY OF TERMINATIONS		p
Total n=443		%No	%Yes	No n=253	Yes n=190	
				Mean (SD)	Mean (SD)	
Alcohol/drug problems in family	Yes	32	49	0.29 (1.60)	1.47 (1.13)	<0.001
	No	63	58	0.32 (1.52)	1.26 (1.09)	<0.001
	Yes	36	42	-0.12 (1.56)	1.50 (1.28)	<0.001
Alcohol/drug problems with close friend or boy/girlfriend	No	53	47	0.27 (1.49)	1.35 (1.16)	<0.001
	Yes	46	53	0.02 (1.60)	1.37 (1.20)	<0.001
<b>FAMILY FUNCTIONING</b>						
Lives with both parents	No	53	73	-0.16 (1.50)	1.24 (1.17)	<0.001
	Yes	47	27	0.49 (1.52)	1.68 (1.15)	<0.001
Family supportive	No	2	8	0.18 (0.70)	1.22 (0.77)	0.010
	Yes	89	84	0.09 (1.55)	1.35 (1.21)	<0.001
<b>NEIGHBOURHOOD</b>						
Number of homes lived in since birth	1-3	41	37	0.39 (1.39)	1.65 (1.12)	<0.001
	≥4	57	62	-0.01 (1.65)	1.19 (1.19)	<0.001
Years at current address	≤1 year	73	39	-0.27 (1.67)	1.19 (1.15)	<0.001
	>1 year	25	58	0.27 (1.48)	1.50 (1.19)	<0.001
	<1 year	22	35	-0.22 (1.70)	1.16 (1.12)	<0.001
	1-5 years	38	33	0.11 (1.51)	1.36 (1.13)	<0.001
	>5 years	39	30	0.35 (1.45)	1.63 (1.25)	<0.001
Safe neighbourhood	Disagree/unsure	26	22	0.18 (1.75)	1.44 (1.25)	<0.001
	Agree	74	76	0.14 (1.47)	1.33 (1.17)	<0.001
Clean neighbourhood	Disagree/unsure	23	19	-0.03 (1.84)	1.51 (1.26)	<0.001
	Agree	77	80	0.20 (1.45)	1.32 (1.17)	<0.001
Theft/vandalism in neighbourhood	No/unsure	25	20	0.21 (1.84)	1.31 (1.30)	0.002
	Yes	75	79	0.13 (1.43)	1.37 (1.16)	<0.001
Violence (any) in neighbourhood	No/unsure	48	44	0.25 (1.58)	1.40 (1.17)	<0.001
	Yes	51	55	0.04 (1.52)	1.32 (1.20)	<0.001
Domestic violence in neighbourhood	No/unsure	62	57	0.26 (1.58)	1.41 (1.15)	<0.001
	Yes	37	42	-0.05 (1.47)	1.29 (1.23)	<0.001
Participated in sport/recreation activities during last 12 months	No	40	53	-0.05 (1.63)	1.23 (1.13)	<0.001
	Yes	59	46	0.29 (1.48)	1.50 (1.23)	<0.001
Participated in youth group activities during last 12 months	No	72	85	0.34 (1.50)	1.34 (1.15)	<0.001
	Yes	26	15	-0.35 (0.19)	1.47 (0.26)	<0.001
<b>SCHOOL</b>						
Ever repeated a year at school	No	91	89	0.18 (1.58)	1.34 (1.19)	<0.001
	Yes	8	10	-0.20 (0.27)	1.43 (0.25)	<0.001
Ever skipped school	No	44	12	0.45 (1.56)	1.40 (1.26)	0.008
	Yes	33	19	0.20 (0.15)	1.67 (0.22)	<0.001
<b>PSYCHOLOGICAL SCALES</b>						
Low personal self-efficacy*	Normal	43	36	0.31 (1.63)	1.41 (1.11)	<0.001

APPENDIX C  
Results relating to application of the "Adolescent Attitudes to Abortion Scale"

Table C.3 continued...

	<i>Borderline/Low self-efficacy</i>	41	41	0.10 (0.13)	1.50 (0.14)	<0.001
Low self-esteem <sup>†</sup>	<i>No</i>	73	67	0.22 (1.58)	1.46 (1.21)	<0.001
	<i>Yes</i>	21	21	0.00 (0.18)	1.38 (0.18)	<0.001
SDQ Emotional difficulties <sup>‡</sup>	<i>Normal</i>	76	70	0.17 (1.63)	1.37 (1.15)	<0.001
	<i>Borderline/abnormal</i>	24	29	0.06 (0.16)	1.37 (0.16)	<0.001
SDQ Conduct problems <sup>‡</sup>	<i>Normal</i>	68	69	0.11 (1.56)	1.35 (1.22)	<0.001
	<i>Borderline/abnormal</i>	32	29	0.22 (0.17)	1.42 (0.14)	<0.001
SDQ Hyperactivity <sup>‡</sup>	<i>Normal</i>	62	63	0.02 (1.63)	1.36 (1.17)	<0.001
	<i>Borderline/abnormal</i>	38	36	0.36 (0.14)	1.39 (0.14)	<0.001
SDQ Peer problems <sup>‡</sup>	<i>Normal</i>	79	73	0.27 (1.55)	1.40 (1.24)	<0.001
	<i>Borderline/abnormal</i>	21	26	-0.30 (0.20)	1.29 (0.13)	<0.001
SDQ Prosocial scale <sup>‡</sup>	<i>Normal</i>	85	85	0.13 (1.53)	1.34 (1.15)	<0.001
	<i>Borderline/abnormal</i>	15	14	0.23 (0.27)	1.58 (0.25)	0.001
SDQ Total difficulties <sup>‡</sup>	<i>Normal</i>	62	63	0.20 (1.64)	1.36 (1.22)	<0.001
	<i>Borderline/abnormal</i>	38	36	0.06 (0.14)	1.39 (0.13)	<0.001
<b>ROMANTIC RELATIONSHIPS</b>						
Current relationship status/duration	<i>Casual partners/single</i>	35	18	0.37 (1.53)	1.60 (1.22)	<0.001
	<i>Time with partner &lt; 1 year</i>	41	46	0.29 (1.51)	1.31 (1.10)	<0.001
	<i>Time with partner ≥1 year</i>	23	35	-0.43 (0.20)	1.32 (0.16)	<0.001
<b>PREGNANCY</b>						
Would like to become a parent soon	<i>Yes</i>	57	71	0.60 (1.53)	1.61 (1.21)	<0.001
	<i>No</i>	15	17	-0.64 (1.21)	0.85 (0.93)	<0.001
Recruitment site	<i>Termination clinic</i>	-	98	-	1.36 (1.18)	-
	<i>Secondary school</i>	70	2	0.51 (1.42)	1.18 (1.16)	0.417

\* Score derived from Cowen's Personal Self-Efficacy Scale (Cowen, et al., 1991).

† Score derived from Rosenberg's Self-Esteem Scale (Rosenberg, 1989).

‡ Score and sub-scales derived from Strengths and Difficulties Questionnaire (Goodman, 1999).

**Table C.4**  
**Rasch Mean AAA Scale Locations (Comparison by Female Recruitment Site)**

Note: % do not sum to 100% if missing data

					RECRUITMENT SITE			p
<i>Total n=1039</i>					Termination service <i>n=187</i>	Antenatal clinic <i>n=75</i>	Secondary school <i>n=777</i>	
					% <sub>term</sub>	% <sub>antenate</sub>	% <sub>school</sub>	
					Mean (SD)	Mean (SD)	Mean (SD)	
All					1.36 (1.18)	-0.72 (1.49)	0.02 (1.54)	<0.001
<b>GENERAL</b>								
Age	≤13	1	0	18	2.69 (n=1)	-	-0.18 (1.41)	0.044
	14-15	10	13	66	1.45 (1.39)	-1.42 (1.33)	0.04 (1.46)	<0.001
	≥16	89	87	16	1.34 (1.16)	-0.61 (1.49)	0.13 (1.90)	<0.001
ATSI	No	98	81	97	1.34 (1.17)	-0.52 (1.46)	0.00 (1.54)	<0.001
	Yes	2	19	3	2.77 (1.39)	-1.61 (1.33)	0.48 (1.26)	<0.001
English spoken at home	No	<1	<1	1	-2.20 (n=1)	-0.91 (n=1)	-1.43 (1.53)	0.184
	Yes	99	99	99	1.36 (1.18)	-0.72 (1.50)	0.04 (1.53)	<0.001
Religious affiliation	None	53	67	37	1.52 (1.17)	-0.66 (1.45)	0.44 (1.27)	<0.001
	Christianity	44	31	58	1.14 (1.17)	-0.87 (1.65)	-0.26 (1.63)	<0.001
	Other	2	3	4	1.91 (1.10)	-0.67 (0.61)	0.21 (1.53)	0.071
<b>FAMILY BACKGROUND</b>								
Mother working	No	24	44	19	1.34 (1.26)	-0.91 (1.60)	0.21 (1.54)	<0.001
	Yes	68	43	74	1.41 (1.16)	-0.42 (1.29)	0.00 (1.55)	<0.001
Father working	No	9	11	5	1.43 (1.45)	-1.03 (1.24)	0.08 (1.42)	<0.001
	Yes	74	59	84	1.41 (1.19)	-0.48 (1.41)	0.03 (1.59)	<0.001
Mother's highest education level	Unsure	13	16	20	1.07 (1.24)	-0.24 (1.86)	0.09 (1.40)	0.004
	Some school	25	41	16	1.42 (1.37)	-1.06 (1.47)	0.13 (1.51)	<0.001
	TAFE/trade/completed high school	47	27	32	1.44 (1.02)	-0.63 (1.20)	0.03 (1.54)	<0.001
	University	12	8	31	1.54 (1.25)	-0.19 (0.89)	-0.08 (1.65)	<0.001
Father's highest education level	Unsure	13	24	25	1.07 (1.20)	-0.70 (1.74)	0.04 (1.26)	<0.001

APPENDIX C  
Results relating to application of the "Adolescent Attitudes to Abortion Scale"

Table C.4 continued...

					RECRUITMENT SITE			p
<i>Total n=1039</i>					Termination service <i>n=187</i>	Antenatal clinic <i>n=75</i>	Secondary school <i>n=777</i>	
					Mean (SD)	Mean (SD)	Mean (SD)	
<i>Some school</i>		24	24	14	1.24 (1.29)	-1.07 (1.36)	-0.02 (1.49)	<0.001
	<i>TAFE/trade/completed high school</i>	37	24	26	1.40 (1.03)	-0.59 (1.04)	0.01 (1.59)	<0.001
	<i>University</i>	14	12	32	1.79 (1.28)	-0.13 (1.18)	0.04 (1.73)	<0.001
<b>ALCOHOL AND/OR OTHER DRUG USE</b>								
Mother smoked ever	<i>No</i>	51	36	83	1.55 (1.27)	-0.74 (1.27)	-0.04 (1.57)	<0.001
	<i>Yes</i>	47	53	16	1.18 (1.06)	-0.72 (1.60)	0.34 (1.39)	<0.001
Father smoked ever	<i>No</i>	45	33	75	1.49 (1.13)	-0.42 (1.20)	0.02 (1.56)	<0.001
	<i>Yes</i>	41	48	21	1.20 (1.20)	-0.90 (1.51)	0.03 (1.48)	<0.001
Mother drinks alcohol	<i>No/occasional</i>	78	77	81	1.34 (1.18)	-0.78 (1.51)	-0.06 (1.52)	<0.001
	<i>Yes</i>	19	11	17	1.58 (1.24)	-0.43 (1.24)	0.38 (1.58)	<0.001
Father drinks alcohol	<i>No/occasional</i>	55	55	69	1.33 (1.07)	-0.60 (1.46)	-0.05 (1.53)	<0.001
	<i>Yes</i>	33	28	27	1.44 (1.34)	-0.81 (1.18)	0.20 (1.57)	<0.001
Ever smoked	<i>No</i>	17	16	73	1.21 (1.42)	-0.85 (1.96)	-0.06 (1.55)	<0.001
	<i>Yes</i>	83	84	26	1.39 (1.13)	-0.70 (1.40)	0.20 (1.48)	<0.001
Ever drunk alcohol	<i>No</i>	1	8	11	1.49 (3.17)	-0.57 (0.78)	-0.45 (1.47)	0.183
	<i>Yes</i>	98	92	82	1.36 (1.17)	-0.74 (1.54)	0.08 (1.55)	<0.001
Ever used illicit drugs	<i>No</i>	51	60	90	1.25 (1.22)	-0.84 (1.62)	-0.05 (1.51)	<0.001
	<i>Yes</i>	49	40	10	1.47 (1.14)	-0.55 (1.27)	0.58 (1.65)	<0.001
Alcohol/drug problems in family	<i>No</i>	58	59	84	1.27 (1.09)	-0.48 (1.51)	0.02 (1.54)	<0.001
	<i>Yes</i>	42	39	16	1.49 (1.29)	-1.10 (1.45)	0.01 (1.48)	<0.001
Alcohol/drug problems with close friend or boy/girlfriend	<i>No</i>	48	53	77	1.35 (1.16)	-0.53 (1.38)	-0.07 (1.54)	<0.001
	<i>Yes</i>	52	45	23	1.37 (1.21)	-0.95 (1.62)	0.30 (1.48)	<0.001
<b>FAMILY FUNCTIONING</b>								
Lives with both parents	<i>No</i>	73	81	25	1.24 (1.17)	-0.79 (1.44)	0.09 (1.45)	<0.001
	<i>Yes</i>	27	19	75	1.68 (1.16)	-0.42 (1.70)	0.00 (1.56)	<0.001

APPENDIX C  
Results relating to application of the "Adolescent Attitudes to Abortion Scale"

Table C.4 continued...

					RECRUITMENT SITE			p
<i>Total n=1039</i>					Termination service <i>n=187</i>	Antenatal clinic <i>n=75</i>	Secondary school <i>n=777</i>	
					Mean (SD)	Mean (SD)	Mean (SD)	
Family supportive	No	8	3	2	1.22 (0.77)	-0.23 (0.65)	0.19 (0.98)	0.004
	Yes	83	87	91	1.35 (1.22)	-0.89 (1.40)	-0.01 (1.55)	<0.001
<b>NEIGHBOURHOOD</b>								
Number of homes lived in since birth	1-3	36	20	59	1.68 (1.11)	-0.31 (1.14)	-0.05 (1.53)	<0.001
	≥4	63	80	40	1.18 (1.19)	-0.83 (1.55)	0.11 (1.54)	<0.001
Years at current address	≤1 year	39	47	14	1.20 (1.15)	-0.82 (1.35)	0.02 (1.60)	<0.001
	>1 year	58	52	85	1.50 (1.20)	-0.67 (1.62)	0.01 (1.53)	<0.001
	<1 year	35	41	12	1.18 (1.12)	-0.78 (1.36)	0.00 (1.63)	<0.001
	1-5 years	33	32	35	1.34 (1.14)	-0.89 (1.55)	0.00 (1.56)	<0.001
	>5 years	30	25	53	1.63 (1.27)	-0.49 (1.66)	0.03 (1.51)	<0.001
Safe neighbourhood	Disagree/unsure	22	35	16	1.42 (1.26)	-0.56 (2.02)	0.10 (1.53)	<0.001
	Agree	76	65	84	1.34 (1.17)	-0.81 (1.13)	0.00 (1.54)	<0.001
Clean neighbourhood	Disagree/unsure	19	28	16	1.49 (1.27)	-0.99 (1.75)	0.07 (1.64)	<0.001
	Agree	80	71	84	1.33 (1.17)	-0.64 (1.38)	0.00 (1.52)	<0.001
Theft/vandalism in neighbourhood	No/unsure	20	24	29	1.35 (1.30)	-0.66 (1.89)	-0.08 (1.61)	<0.001
	Yes	79	76	71	1.36 (1.16)	-0.74 (1.36)	0.06 (1.51)	<0.001
Violence (any) in neighbourhood	No/unsure	57	56	82	1.42 (1.15)	-0.55 (1.48)	-0.01 (1.56)	<0.001
	Yes	42	41	17	1.28 (1.23)	-1.04 (1.47)	0.14 (1.45)	<0.001
Domestic violence in neighbourhood	No/unsure	44	43	71	1.42 (1.17)	-0.64 (1.26)	-0.04 (1.57)	<0.001
	Yes	55	55	28	1.31 (1.21)	-0.85 (1.65)	0.16 (1.43)	<0.001
Participated in sport/recreation activities during last 12 months	No	53	67	25	1.24 (1.13)	-0.85 (1.39)	0.07 (1.45)	<0.001
	Yes	47	33	74	1.49 (1.24)	-0.47 (1.68)	0.00 (1.57)	<0.001
Participated in youth group activities during last 12 months	No	84	73	68	1.34 (1.15)	-0.48 (1.51)	0.25 (1.49)	<0.001
	Yes	15	25	31	1.47 (1.36)	-1.40 (1.26)	-0.52 (1.52)	<0.001

APPENDIX C  
Results relating to application of the “Adolescent Attitudes to Abortion Scale”

Table C.4 continued...

					RECRUITMENT SITE			p
<i>Total n=1039</i>					Termination service <i>n=187</i>	Antenatal clinic <i>n=75</i>	Secondary school <i>n=777</i>	
					Mean (SD)	Mean (SD)	Mean (SD)	
<b>SCHOOL</b>								
Ever repeated a year at school	No	90	84	95	1.35 (1.19)	-0.71 (1.58)	0.01 (1.55)	<0.001
	Yes	10	13	3	1.39 (1.09)	-0.82 (0.99)	0.26 (1.12)	<0.001
Ever skipped school	No	11	11	77	1.44 (1.27)	-1.13 (1.24)	-0.06 (1.56)	<0.001
	Yes	19	16	21	1.68 (1.33)	-1.23 (1.04)	0.29 (1.44)	<0.001
<b>PSYCHOLOGICAL SCALES</b>								
Low personal self-efficacy <sup>*</sup>	Normal	36	31	44	1.43 (1.11)	-0.81 (1.50)	0.02 (1.58)	<0.001
	Borderline/Low self-efficacy	42	39	42	1.50 (1.26)	-0.55 (1.13)	0.04 (1.48)	<0.001
Low self-esteem <sup>†</sup>	No	67	76	79	1.47 (1.21)	-0.72 (1.43)	-0.02 (1.53)	<0.001
	Yes	21	17	16	1.38 (1.18)	-0.81 (1.17)	0.20 (1.57)	<0.001
SDQ Emotional difficulties <sup>‡</sup>	Normal	71	75	80	1.38 (1.15)	-0.83 (1.42)	0.05 (1.50)	<0.001
	Borderline/abnormal	28	25	19	1.36 (1.23)	-0.39 (1.67)	-0.12 (1.63)	<0.001
SDQ Conduct problems <sup>‡</sup>	Normal	70	72	79	1.36 (1.22)	-0.86 (1.44)	-0.03 (1.51)	<0.001
	Borderline/abnormal	29	28	20	1.41 (1.04)	-0.37 (1.58)	0.20 (1.60)	<0.001
SDQ Hyperactivity <sup>‡</sup>	Normal	64	76	67	1.37 (1.16)	-0.75 (1.55)	-0.09 (1.53)	<0.001
	Borderline/abnormal	35	24	33	1.37 (1.19)	-0.64 (1.30)	0.25 (1.51)	<0.001
<i>Total n=1039</i>					Termination service <i>n=187</i>	Antenatal clinic <i>n=75</i>	Secondary school <i>n=777</i>	p
					Mean (SD)	Mean (SD)	Mean (SD)	

<sup>\*</sup> Score derived from Cowen’s Personal Self-Efficacy Scale (Cowen, et al., 1991).

<sup>†</sup> Score derived from Rosenberg’s Self-Esteem Scale (Rosenberg, 1989).

<sup>‡</sup> Score and sub-scales derived from Strengths and Difficulties Questionnaire (Goodman, 1999).

# APPENDIX C

## Results relating to application of the "Adolescent Attitudes to Abortion Scale"

Table C.4 continued...

SDQ Peer problems <sup>‡</sup>	<i>Normal</i>	73	61	85	1.41 (1.25)	-0.60 (1.48)	0.07 (1.51)	<0.001
	<i>Borderline/abnormal</i>	26	39	14	1.29 (0.92)	-0.92 (1.51)	-0.26 (1.62)	<0.001
SDQ Prosocial scale <sup>‡</sup>	<i>Normal</i>	85	84	86	1.34 (1.15)	-0.75 (1.46)	-0.05 (1.54)	<0.001
	<i>Borderline/abnormal</i>	14	16	14	1.58 (1.28)	-0.56 (1.70)	0.42 (1.43)	<0.001
SDQ Total difficulties <sup>‡</sup>	<i>Normal</i>	64	63	75	1.37 (1.22)	-0.86 (1.53)	0.00 (1.50)	<0.001
	<i>Borderline/abnormal</i>	35	37	24	1.38 (1.09)	-0.49 (1.42)	0.07 (1.61)	<0.001
<b>ROMANTIC RELATIONSHIPS</b>								
Current relationship status/duration	<i>Casual partners/single</i>	18	23	74	1.61 (1.24)	-0.74 (2.04)	-0.07 (1.50)	<0.001
	<i>Time with partner &lt; 1 year</i>	47	23	21	1.30 (1.10)	-0.38 (1.15)	0.29 (1.64)	<0.001
	<i>Time with partner ≥1 year</i>	35	55	3	1.32 (1.26)	-0.86 (1.35)	0.36 (1.31)	<0.001
<b>PREGNANCY</b>								
Would like to become a parent soon	<i>Yes</i>	18	25	8	0.85 (0.93)	-0.96 (1.06)	-0.31 (1.39)	<0.001
	<i>No</i>	70	12	82	1.62 (1.21)	-0.13 (2.15)	0.09 (1.58)	<0.001
Previous history of a termination	<i>Yes</i>	100	0	<1 (n=3)	1.36 (1.18)	-	1.18 (1.16)	0.795
	<i>No</i>	0	100	<1 (n=3)	-	-0.72 (1.49)	-0.69 (1.09)	0.971

**Table C.5**  
**AAA Scale Adjusted Univariate Linear Regression Models (Comparisons by Sexual Activity Status)**

		B	SE(B)	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>				<b>0.134</b>		<b>&lt;0.001</b>
Age		-0.003	0.037			
ATSI		-0.005	0.179			
Female – sexually active, termination service		1.504	0.151			
Female – sexually active, antenatal clinic		-0.581	0.190			
Female – sexually active, secondary school		0.662	0.119			
Male – sexually active		0.616	0.143			
Male – not sexually active		0.085	0.095			
<b>Plus (added individually):</b>						
<i>General</i>						
English spoken at home		1.085	0.398	0.139	0.004	0.006
Religious affiliation = Christianity		-0.278	0.171	0.162	0.028	<0.001
<i>Family background</i>						
Mother working		0.048	0.091	0.132	0.000	0.595
Father working		0.194	0.162	0.132	0.001	0.230
Mother's highest education level	<i>Some school</i>	-0.038	0.104	0.135	0.000	0.609
	<i>Finish school/TAFE</i>	0.028	0.080	0.135	0.000	0.726
Father's highest education level	<i>Some school</i>	-0.231	0.122	0.141	0.002	0.166
	<i>Finish school/TAFE</i>	-0.144	0.100	0.143	0.002	0.153
<i>Alcohol and/or other drug use</i>						
Mother smoked ever		0.064	0.093	0.135	0.000	0.492
Father smoked ever		-0.103	0.087	0.128	0.001	0.237
Mother drinks alcohol		0.348	0.097	0.143	0.008	<0.001
Father drinks alcohol		0.192	0.018	0.133	0.004	0.017
Ever smoked		0.029	0.091	0.137	0.000	0.745
Ever drunk alcohol		0.394	0.119	0.147	0.007	0.001
Ever used illicit drugs		0.234	0.108	0.137	0.003	0.029
Alcohol/drug problems in family		-0.142	0.096	0.137	0.001	0.137
Alcohol/drug problems with close friend						
Parents would find out if drank alcohol		-0.284	0.076	0.139	0.009	<0.001
<i>Family functioning</i>						
Lives with both parents		0.112	0.085	0.135	0.001	0.185
Family supportive		-0.137	0.207	0.137	0.000	0.507
<i>Neighbourhood</i>						
Number homes lived in since birth						
(>7 years is the reference category)	<i>1-3</i>	0.172	0.102	0.138	0.000	0.606
	<i>4-6</i>	0.208	0.110	0.140	0.002	0.057
Years at current address						
(>5 years is the reference category)	<i>&lt;1</i>	-0.154	0.112	0.136	0.000	0.376
	<i>1-5</i>	-0.133	0.079	0.138	0.002	0.094
Violence (any) in neighbourhood		0.027	0.080	0.136	0.000	0.740
Participated in youth group activities during last 12 months		-0.523	0.079	0.157	0.026	<0.001
<i>School</i>						
Ever skipped school		0.147	0.094	0.095	0.002	0.120
<i>Psychological scales</i>						
Low personal self-efficacy*		0.070	0.079	0.137	0.001	0.375
SDQ Hyperactivity†		0.144	0.077	0.139	0.002	0.062
SDQ Peer problems†		-0.187	0.092	0.140	0.002	0.043
SDQ Prosocial†		0.282	0.092	0.143	0.006	0.002
<i>Romantic relationships</i>						
Current relationship status/duration:	<i>&lt;1 year</i>	-0.006	0.098	0.136	0.000	0.990
	<i>≥1 year</i>	-0.022	0.145	0.136	0.000	0.882

\* Score derived from Cowen's Personal Self-Efficacy Scale (Cowen, et al., 1991).

† Score and sub-scales derived from Strengths and Difficulties Questionnaire (Goodman, 1999)



APPENDIX C  
Results relating to application of the "Adolescent Attitudes to Abortion Scale"

Table C.5 continued...

		B	SE(B)	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<i>Sexual behaviour</i>						
Age at sexual debut:	≤15	0.523	0.250	0.134	0.000	0.826
	≥16	0.722	0.300	0.138	0.004	0.016

Note: Each variable entered individually in addition to the Base model. Variables were not tested if they were not found to be statistically significant in Table C.1

Reference category: Female – not sexually active, secondary school

**Table C.6**  
**AAA Scale Adjusted Univariate Linear Regression Models (Comparisons by Sexual Activity for Males only)**

	B	SE(B)	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>			<b>0.039</b>		<b>&lt;0.001</b>
Age	-0.010	0.064			
ATSI	0.059	0.248			
+Male – sexually active	0.531	0.129			
<b>Plus (added individually):</b>					
English = main language	1.275	0.577	0.051	0.011	0.028
Religious affiliation = Christianity	-0.433	0.112	0.072	0.033	0.000
Mother works	0.339	0.140	0.047	0.014	0.016
Mother drinks alcohol	0.377	0.154	0.053	0.014	0.015
Father drinks alcohol	0.300	0.124	0.052	0.014	0.016
Ever drunk alcohol	0.514	0.159	0.071	0.025	0.001
Parents would find out if drank alcohol	-0.420	0.116	0.071	0.030	<0.001

Note: Each variable entered individually in addition to the Base model. Variables were not tested if they were not found to be statistically significant in Table C.1

Whilst a broad range of variables were tested, only the significant variables with an R<sup>2</sup> change >1% are listed

Reference category: Male – not sexually active

**Table C.7**  
**AAA Scale Adjusted Multivariable Linear Regression Model (Comparisons by Sexual Activity for Males only)**

	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<i>n=375</i>							
<b>BASE model:</b>					<b>0.040</b>		<b>&lt;0.001</b>
Age	0.042		0.066				
ATSI	0.079		0.245				
+Male – sexually active	0.380		0.136				
English = main language	1.706	0.434, 2.979	0.647	0.009	0.130	0.021	0.006
Religious affiliation = Christianity	-0.433	-0.680, -0.186	0.126	0.001	0.080	0.040	<0.001
Ever drunk alcohol	0.384	0.035, 0.733	0.178	0.031	0.142	0.012	0.031
Parents would find out if drank alcohol	-0.394	0.649, -0.139	0.130	0.003	0.109	0.029	0.001

Note: Variables considered in the model were “*English spoken at home*” “*religious affiliation=Christianity*,” “*mother works*,” “*mother drinks alcohol*,” “*father drinks alcohol*,” “*ever drunk alcohol*,” and “*parents would find out if drank alcohol*.” Items in bold were retained in the model (R<sup>2</sup>>1%, p<0.05).

Adding the scores from the Adolescent Parenthood and Contraception scales to this model had no effect

Reference category: Male – not sexually active

**Table C.8**  
**AAA Scale Adjusted Univariate Linear Regression Models (Comparisons by Sexual Activity for Females only)**

	B	SE(B)	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>			<b>0.069</b>		<b>&lt;0.001</b>
Age	0.061	0.041			
ATSI	-0.512	0.245			
+Female – sexually active	0.721	0.120			
<b>Plus (added individually):</b>					
Religious affiliation = Christianity	-0.480	0.096	0.091	0.022	<0.001
Participated in youth group activities during last 12 months	-0.698	0.105	0.109	0.038	<0.001
Prior history of abortion	1.397	0.159	0.180	0.145	<0.001

Note: Each variable entered individually in addition to the Base model. Variables were not tested if they were not found to be statistically significant in Table C.1

Whilst a broad range of variables were tested, only the significant variables with an R<sup>2</sup> change >1% are listed

Reference category: Female – not sexually active

**Table C.9**

**AAA Scale Adjusted Multivariable Linear Regression Model (Comparisons by Sexual Activity for Females only)**

<i>n</i> =442	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.035</b>		<b>&lt;0.001</b>
Age	0.155		0.055				
ATSI	-0.551		0.270				
Prior history of abortion	1.397	1.085, 1.709	0.204	<0.001	0.180	0.145	<0.001

Note: Variables considered in the model were “religious affiliation=Christianity,” “participated in youth group activities during last 12 months” and “**prior history of abortion.**” Items in bold were retained in the model ( $R^2>1\%$ ,  $p<0.05$ ).

Sample size reduced to  $n=442$  as only sexually active females remained in the model (due to presence of “prior history of abortion” variable).

**Table C.10**

**AAA Scale Adjusted Multivariable Linear Regression Model (Comparisons by Sexual Activity for Females only)**

<i>n</i> =1023	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.070</b>		<b>&lt;0.001</b>
Age	0.048		0.040				
ATSI	-0.427		0.242				
+Female – sexually active	0.602		0.119				
Religious affiliation = Christianity	-0.383	-0.573, -0.192	0.097	<0.001	0.122	0.013	<0.001
Participated in youth group activities during last 12 months	-0.619	-0.829, -0.409	0.107	<0.001	0.108	0.038	<0.001

Note: Variables considered in the model were “religious affiliation=Christianity” and “**participated in youth group activities during last 12 months.**” Items in bold were retained in the model ( $R^2>1\%$ ,  $p<0.05$ ).

Reference category: Female – not sexually active

**Table C.11**

**AAA Scale Adjusted Multivariable Linear Regression Model (Comparisons by Sexual Activity for Females only, plus Addition of Other Rasch-derived Locations)**

<i>n</i> =442	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.035</b>		<b>&lt;0.001</b>
Age	-0.014						
ATSI	-0.262						
Prior history of abortion	0.901	0.618, 1.184	0.144	0.144	0.180	0.145	<0.001
Attitudes to Adolescent Parenthood score	0.476	0.398, 0.555	0.040	0.040	0.382	0.202	<0.001

Note: Variables considered in the model were “religious affiliation=Christianity,” “participated in youth group activities during last 12 months,” “**prior history of abortion,**” “**Attitudes to Adolescent Parenthood score**” and “Adolescent Attitudes to Contraception score.” Items in bold were retained in the model ( $R^2>1\%$ ,  $p<0.05$ ).

Sample size reduced to  $n=442$  as only sexually active females remained in the model (due to presence of “prior history of abortion” variable).

**Table C.12**

**AAA Scale Adjusted Multivariable Linear Regression Model (Comparisons by Sexual Activity for Females only, plus Addition of Other Rasch-derived Locations)**

<i>n</i> =907	B	95% CI (B)	SE(B)	p	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>					<b>0.070</b>		<b>&lt;0.001</b>
Age	0.092		0.038				
ATSI	-0.233		0.234				
+Female – sexually active	0.620		0.114				
Religious affiliation = Christianity	-0.469	-0.653, -0.285	0.094	<0.001	0.110	0.010	0.002
Participated in youth group activities during last 12 months	-0.582	-0.785, -0.379	0.103	<0.001	0.101	0.038	<0.001
Adolescent Attitudes to Contraception score	-0.250	-0.365, -0.136	0.058	<0.001	0.257	0.015	<0.001
Attitudes to Adolescent Parenthood score	0.449	0.382, 0.515	0.034	<0.001	0.241	0.131	<0.001

Note: Variables considered in the model were “**religious affiliation=Christianity,**” “**participated in youth group activities during last 12 months,**” “**Attitudes to Adolescent Parenthood score**” and “**Adolescent Attitudes to Contraception score.**” Items in bold were retained in the model ( $R^2 > 1\%$ ,  $p < 0.05$ ).

Reference category: Female – not sexually active

## APPENDIX D

### *Results relating to application of the “Adolescent Attitudes to Adolescent Parenthood Scale”*

**Table D.1**

**Rasch Mean AAAP Scale Locations (Comparisons by Sexual Activity Status within Gender)**

<sup>Δ</sup>SA = sexually active (any sexual activity i.e. oral sex and/or intercourse), sexual activity status missing for two males and seven females.

Note: % do not sum to 100% if missing data

		MALES					FEMALES				
<i>Total n=1595</i>		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=366	SA <sup>Δ</sup> n=115	p	% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=656	SA <sup>Δ</sup> n=458	p
All				Mean (SD) 1.20 (1.16)	Mean (SD) 1.00 (1.26)	0.122			Mean (SD) 1.76 (1.25)	Mean (SD) 1.13 (1.52)	<0.001
<b>GENERAL</b>											
Age	≤13	21	9	1.19 (1.06)	1.12 (1.04)	0.848	20	4	1.69 (1.21)	1.79 (1.15)	0.736
	14-15	72	79	1.18 (1.20)	0.97 (1.29)	0.142	69	31	1.74 (1.24)	1.29 (1.38)	<0.001
	≥16	7	12	1.32 (1.09)	1.13 (1.31)	0.626	11	64	1.95 (1.34)	1.00 (1.59)	<0.001
ATSI	No	95	91	1.21 (1.17)	0.99 (1.19)	0.084	98	93	1.76 (1.25)	1.18 (1.53)	<0.001
	Yes	5	9	0.90 (1.01)	1.14 (1.97)	0.665	2	7	1.49 (1.15)	0.28 (1.03)	0.001
English spoken at home	No	1	1	0.82 (0.66)	2.74 (n=1)	0.129	1	1	2.83 (1.56)	1.29 (1.58)	0.228
	Yes	98	99	1.19 (1.16)	0.98 (1.26)	0.104	98	99	1.75 (1.24)	1.12 (1.52)	<0.001
Religious affiliation	None	42	60	1.15 (1.17)	0.90 (1.28)	0.152	32	55	1.58 (1.22)	0.91 (1.50)	<0.001
	Christianity	50	33	1.19 (1.14)	1.14 (1.26)	0.804	63	42	1.85 (1.27)	1.37 (1.50)	<0.001
	Other	6	7	1.51 (1.24)	1.20 (1.22)	0.540	4	3	1.82 (0.95)	1.59 (1.62)	0.562
<b>FAMILY BACKGROUND</b>											
Mother working	No	20	17	1.13 (1.25)	0.73 (1.54)	0.241	18	26	1.94 (1.34)	0.97 (1.59)	<0.001
	Yes	72	74	1.18 (1.13)	1.11 (1.23)	0.601	75	65	1.75 (1.21)	1.28 (1.48)	<0.001
Father working	No	3	7	0.67 (0.47)	0.94 (1.26)	0.529	4	9	1.83 (1.61)	0.60 (1.39)	0.001
	Yes	85	80	1.21 (1.15)	0.98 (1.29)	0.101	85	73	1.77 (1.21)	1.32 (1.53)	<0.001
Mother's highest education level	Unsure	29	18	1.22 (1.23)	0.92 (1.21)	0.301	20	17	1.61 (1.16)	0.90 (1.49)	<0.001
	Some school	10	16	0.87 (0.76)	0.32 (1.20)	0.043	13	27	1.79 (1.30)	0.92 (1.54)	<0.001
	TAFE/trade/completed high school	32	35	1.18 (1.17)	0.98 (1.29)	0.358	31	37	1.71 (1.24)	1.35 (1.48)	0.012
	University	27	30	1.33 (1.23)	1.43 (1.19)	0.684	34	17	1.86 (1.28)	1.39 (1.46)	0.008
Father's highest education level	Unsure	26	19	1.27 (1.19)	0.86 (0.99)	0.135	26	20	1.60 (1.20)	0.89 (1.53)	<0.001

APPENDIX D  
Results relating to application of the "Adolescent Attitudes to Adolescent Parenthood Scale"

Table D.1 continued...

		MALES					FEMALES				
		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=366	SA <sup>Δ</sup> n=115	p	% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=656	SA <sup>Δ</sup> n=458	p
Total n=1595											
				Mean (SD)	Mean (SD)				Mean (SD)	Mean (SD)	
Some school TAFE/trade/completed high school University		12	19	1.26 (1.08)	1.01 (1.38)	0.427	12	22	1.72 (1.26)	0.98 (1.40)	<0.001
		34	38	1.15 (1.09)	0.83 (1.32)	0.117	25	32	1.57 (1.15)	1.27 (1.59)	0.063
		23	21	1.16 (1.26)	1.35 (1.27)	0.507	35	16	2.00 (1.28)	1.50 (1.50)	0.006
ALCOHOL AND/OR OTHER DRUG USE											
Mother smoked ever	No	83	70	1.20 (1.16)	1.07 (1.14)	0.362	86	57	1.78 (1.23)	1.30 (1.42)	<0.001
	Yes	14	28	1.18 (1.18)	0.84 (1.58)	0.265	12	40	1.60 (1.30)	0.95 (1.61)	0.002
Father smoked ever	No	75	72	1.19 (1.15)	1.03 (1.11)	0.280	78	52	1.77 (1.24)	1.32 (1.44)	<0.001
	Yes	20	24	1.19 (1.16)	0.80 (1.66)	0.187	19	37	1.66 (1.20)	0.93 (1.63)	<0.001
Mother drinks alcohol	No/occasional	82	83	1.23 (1.19)	0.96 (1.35)	0.061	86	57	1.78 (1.23)	1.30 (1.42)	<0.001
	Yes	16	15	1.10 (1.09)	1.25 (0.72)	0.605	12	40	1.60 (1.30)	0.95 (1.61)	0.002
Father drinks alcohol	No/occasional	67	66	1.26 (1.18)	0.94 (1.35)	0.045	78	52	1.77 (1.24)	1.32 (1.44)	<0.001
	Yes	28	30	1.06 (1.08)	1.06 (1.07)	0.996	19	37	1.66 (1.20)	0.93 (1.63)	<0.001
Ever smoked	No	83	57	1.23 (1.18)	0.97 (0.99)	0.101	84	27	1.79 (1.24)	1.35 (1.48)	0.001
	Yes	15	42	0.95 (0.94)	1.04 (1.59)	0.700	16	73	1.51 (1.25)	1.04 (1.53)	0.005
Ever drunk alcohol	No	17	9	1.05 (1.37)	1.32 (1.66)	0.573	15	2	1.92 (1.37)	0.47 (1.53)	0.003
	Yes	72	86	1.21 (1.09)	0.98 (1.25)	0.090	77	96	1.74 (1.23)	1.13 (1.53)	<0.001
Ever used illicit drugs	No	94	86	1.21 (1.18)	1.03 (1.20)	0.188	96	62	1.77 (1.25)	1.13 (1.49)	<0.001
	Yes	6	14	0.98 (0.90)	0.80 (1.63)	0.660	4	38	1.34 (1.06)	1.12 (1.57)	0.466
Alcohol/drug problems in family	No	86	79	1.23 (1.18)	1.06 (1.21)	0.235	89	61	1.79 (1.26)	1.14 (1.47)	<0.001
	Yes	13	20	0.90 (0.96)	0.83 (1.44)	0.793	10	38	1.43 (1.12)	1.13 (1.59)	0.159
Alcohol/drug problems with close friend or boy/girlfriend	No	91	67	1.18 (1.15)	0.92 (1.11)	0.080	85	51	1.78 (1.24)	1.16 (1.50)	<0.001
	Yes	9	31	1.28 (1.20)	1.33 (1.33)	0.880	15	48	1.60 (1.32)	1.10 (1.53)	0.005
Parents would find out if drank alcohol	No	34	55	1.19 (1.11)	1.12 (1.17)	0.673	33	56	1.56 (1.24)	1.21 (1.53)	0.007

APPENDIX D  
Results relating to application of the "Adolescent Attitudes to Adolescent Parenthood Scale"

Table D.1 continued...

		MALES					FEMALES				
		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=366	SA <sup>Δ</sup> n=115	p	% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=656	SA <sup>Δ</sup> n=458	p
<b>Total n=1595</b>											
				<b>Mean (SD)</b>	<b>Mean (SD)</b>				<b>Mean (SD)</b>	<b>Mean (SD)</b>	
	Yes	61	41	1.18 (1.18)	1.00 (1.26)	0.353	59	34	1.81 (1.22)	1.08 (1.45)	<0.001
<b>FAMILY FUNCTIONING</b>											
Lives with both parents	No	23	33	1.29 (1.30)	0.86 (1.49)	0.105	19	60	1.69 (1.29)	0.93 (1.57)	<0.001
	Yes	77	67	1.17 (1.12)	1.07 (1.14)	0.500	81	40	1.77 (1.24)	1.42 (1.39)	0.002
Family supportive	No	1	5	0.28 (0.84)	0.67 (2.00)	0.732	2	5	1.48 (1.25)	0.93 (1.51)	0.257
	Yes	95	92	1.21 (1.16)	1.04 (1.23)	0.206	92	87	1.78 (1.25)	1.13 (1.49)	<0.001
Ask parents for help with personal problems	No	17	22	1.11 (1.18)	1.04 (1.36)	0.806	19	24	1.54 (1.29)	1.21 (1.34)	0.057
	Yes	80	77	1.20 (1.15)	1.04 (1.16)	0.243	79	74	1.79 (1.23)	1.11 (1.57)	<0.001
Family rules are clear	No	13	16	0.84 (1.07)	0.84 (1.27)	0.985	16	26	1.61 (1.29)	0.88 (1.62)	<0.001
	Yes	87	84	1.25 (1.17)	1.03 (1.27)	0.111	84	74	1.78 (1.24)	1.21 (1.47)	<0.001
Parents control everything	No	62	58	1.19 (1.12)	1.08 (1.21)	0.497	60	61	1.77 (1.26)	1.14 (1.54)	<0.001
	Yes	37	41	1.20 (1.20)	0.88 (1.36)	0.134	38	33	1.73 (1.25)	1.28 (1.44)	0.001
Parents ask my thoughts before family decisions affecting me are made	No	23	29	1.09 (1.07)	0.94 (1.30)	0.508	23	33	1.57 (1.26)	1.04 (1.36)	<0.001
	Yes	75	70	1.21 (1.18)	1.01 (1.25)	0.196	74	64	1.79 (1.24)	1.22 (1.56)	<0.001
Parents overprotect	No	77	67	1.21 (1.15)	0.95 (1.17)	0.085	71	71	1.84 (1.27)	1.16 (1.52)	<0.001
	Yes	21	32	1.08 (1.12)	1.11 (1.47)	0.896	27	25	1.50 (1.18)	1.17 (1.45)	0.032
<b>NEIGHBOURHOOD</b>											
Number of homes lived in since birth	1-3	56	49	1.18 (1.12)	1.07 (1.43)	0.517	61	39	1.76 (1.24)	1.38 (1.41)	0.001
	≥4	42	50	1.20 (1.20)	0.91 (1.10)	0.115	37	59	1.75 (1.27)	0.97 (1.57)	<0.001
Years at current address	≤1 year	89	88	1.20 (1.17)	1.01 (1.23)	0.172	86	67	1.77 (1.24)	1.21 (1.47)	<0.001
	>1 year	8	10	1.15 (1.16)	0.94 (1.66)	0.644	13	30	1.75 (1.34)	0.93 (1.61)	<0.001
	<1 year	8	8	1.16 (1.21)	0.99 (1.86)	0.746	11	27	1.77 (1.37)	0.94 (1.61)	<0.001
	1-5 years	40	37	1.26 (1.28)	0.98 (1.13)	0.214	33	36	1.79 (1.23)	1.25 (1.54)	<0.001



APPENDIX D  
Results relating to application of the “Adolescent Attitudes to Adolescent Parenthood Scale”

Table D.1 continued...

		MALES					FEMALES				
Total n=1595		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=366	SA <sup>Δ</sup> n=115	p	% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=656	SA <sup>Δ</sup> n=458	p
	>5 years	51	53	Mean (SD) 1.15 (1.06)	Mean (SD) 1.02 (1.28)	0.441	55	35	Mean (SD) 1.74 (1.23)	Mean (SD) 1.15 (1.42)	<0.001
Safe neighbourhood	Disagree/unsure	13	20	1.43 (1.16)	0.83 (1.13)	0.044	14	24	1.79 (1.41)	1.07 (1.50)	<0.001
	Agree	87	80	1.16 (1.16)	1.04 (1.30)	0.408	85	75	1.75 (1.22)	1.15 (1.53)	<0.001
Clean neighbourhood	Disagree/unsure	16	19	1.16 (1.03)	0.73 (1.32)	0.124	14	21	1.71 (1.34)	1.07 (1.47)	0.002
	Agree	84	79	1.20 (1.19)	1.11 (1.17)	0.542	85	78	1.77 (1.23)	1.15 (1.53)	<0.001
Theft/vandalism in neighbourhood	No/unsure	30	30	1.08 (1.10)	1.01 (1.15)	0.734	31	22	1.74 (1.27)	1.31 (1.63)	0.011
	Yes	69	70	1.24 (1.19)	1.00 (1.31)	0.113	68	77	1.77 (1.24)	1.08 (1.48)	<0.001
Violence (any) in neighbourhood	No/unsure	71	65	1.22 (1.16)	1.05 (1.23)	0.273	78	48	1.78 (1.26)	1.25 (1.54)	<0.001
	Yes	28	35	1.13 (1.13)	0.91 (1.33)	0.331	22	52	1.67 (1.20)	1.03 (1.50)	<0.001
Domestic violence in neighbourhood	No/unsure	82	76	1.20 (1.17)	0.99 (1.19)	0.139	88	61	1.78 (1.25)	1.24 (1.52)	<0.001
	Yes	17	24	1.13 (1.10)	1.02 (1.48)	0.698	12	38	1.61 (1.23)	0.97 (1.52)	0.001
Participated in sport/recreation activities during last 12 months	No	18	12	1.29 (1.30)	0.31 (0.79)	0.009	22	45	1.66 (1.27)	0.88 (1.60)	<0.001
	Yes	81	88	1.16 (1.12)	1.09 (1.29)	0.635	77	54	1.79 (1.24)	1.34 (1.43)	<0.001
Participated in youth group activities during last 12 months	No	67	63	1.20 (1.15)	0.99 (1.09)	0.167	68	78	1.79 (1.24)	1.14 (1.49)	<0.001
	Yes	32	37	1.18 (1.18)	1.01 (1.53)	0.460	31	22	1.71 (1.29)	1.10 (1.65)	0.001
<b>SCHOOL</b>											
Ever repeated a year at school	No	94	89	1.20 (1.14)	1.09 (1.28)	0.401	96	90	1.77 (1.25)	1.15 (1.51)	<0.001
	Yes	6	11	1.18 (1.47)	0.32 (0.95)	0.067	3	8	1.35 (1.11)	1.05 (1.65)	0.480
Ever skipped school	No	77	70	1.26 (1.16)	0.96 (1.21)	0.050	84	31	1.79 (1.24)	1.57 (1.53)	0.078
	Yes	21	30	0.91 (1.08)	1.11 (1.39)	0.419	16	27	1.61 (1.29)	1.12 (1.33)	0.005
<b>PSYCHOLOGICAL SCALES</b>											

APPENDIX D  
Results relating to application of the “Adolescent Attitudes to Adolescent Parenthood Scale”

Table D.1 continued...

		MALES					FEMALES				
<i>Total n=1595</i>		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=366	SA <sup>Δ</sup> n=115	p	% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=656	SA <sup>Δ</sup> n=458	p
				Mean (SD)	Mean (SD)				Mean (SD)	Mean (SD)	
Low personal self-efficacy <sup>*</sup>	<i>Normal</i>	44	50	1.41 (1.23)	1.34 (1.29)	0.714	44	40	1.93 (1.25)	1.40 (1.65)	<0.001
	<i>Borderline/Low self-efficacy</i>	38	35	0.88 (0.98)	0.82 (1.10)	0.727	41	41	1.58 (1.24)	0.98 (1.34)	<0.001
Low self-esteem <sup>†</sup>	<i>No</i>	84	87	1.16 (1.16)	1.05 (1.25)	0.426	81	71	1.78 (1.24)	1.18 (1.55)	<0.001
	<i>Yes</i>	9	8	1.21 (1.23)	0.81 (1.55)	0.429	14	20	1.56 (1.20)	1.09 (1.43)	0.018
SDQ Emotional difficulties <sup>‡</sup>	<i>Normal</i>	92	92	1.22 (1.15)	0.99 (1.24)	0.086	82	74	1.77 (1.22)	1.18 (1.55)	<0.001
	<i>Borderline/abnormal</i>	7	7	0.71 (1.15)	1.12 (1.65)	0.437	17	26	1.67 (1.37)	0.98 (1.41)	<0.001
SDQ Conduct problems <sup>‡</sup>	<i>Normal</i>	76	58	1.28 (1.17)	1.12 (1.30)	0.341	84	69	1.81 (1.23)	1.15 (1.54)	<0.001
	<i>Borderline/abnormal</i>	23	41	0.87 (1.05)	0.83 (1.21)	0.856	16	30	1.46 (1.28)	1.08 (1.47)	0.038
SDQ Hyperactivity <sup>‡</sup>	<i>Normal</i>	72	63	1.25 (1.19)	0.91 (1.35)	0.035	71	62	1.85 (1.23)	1.09 (1.59)	<0.001
	<i>Borderline/abnormal</i>	27	36	0.99 (1.03)	1.17 (1.10)	0.381	29	37	1.50 (1.26)	1.18 (1.39)	0.020
SDQ Peer problems <sup>‡</sup>	<i>Normal</i>	81	77	1.22 (1.12)	1.14 (1.26)	0.587	86	77	1.78 (1.23)	1.23 (1.52)	<0.001
	<i>Borderline/abnormal</i>	18	22	1.03 (1.29)	0.51 (1.20)	0.080	14	22	1.56 (1.33)	0.78 (1.47)	<0.001
SDQ Prosocial scale <sup>‡</sup>	<i>Normal</i>	64	70	1.33 (1.20)	1.24 (1.25)	0.561	87	84	1.76 (1.23)	1.12 (1.49)	<0.001
	<i>Borderline/abnormal</i>	35	30	0.93 (1.03)	0.46 (1.14)	0.022	13	15	1.73 (1.35)	1.15 (1.65)	0.019
SDQ Total difficulties <sup>‡</sup>	<i>Normal</i>	80	70	1.24 (1.15)	1.03 (1.25)	0.160	80	63	1.81 (1.21)	1.24 (1.54)	<0.001
	<i>Borderline/abnormal</i>	19	30	0.96 (1.17)	0.94 (1.33)	0.945	19	36	1.52 (1.38)	0.92 (1.45)	<0.001
<b>FRIENDSHIPS</b>											
Experienced negative treatment by others	<i>No</i>	3	2	0.62 (0.97)	0.61 (1.94)	0.986	4	1	2.38 (1.28)	1.40 (1.73)	0.179
	<i>Yes</i>	96	98	1.20 (1.16)	1.01 (1.26)	0.124	95	98	1.73 (1.24)	1.12 (1.52)	<0.001
Any close friends	<i>No</i>	4	3	1.21 (0.81)	-0.06 (1.24)	0.037	3	2	1.92 (1.28)	1.09 (1.76)	0.171
	<i>Yes</i>	95	97	1.19 (1.17)	1.03 (1.26)	0.231	96	97	1.75 (1.25)	1.12 (1.52)	<0.001

<sup>\*</sup> Score derived from Cowen’s Personal Self-Efficacy Scale (Cowen, et al., 1991).

<sup>†</sup> Score derived from Rosenberg’s Self-Esteem Scale (Rosenberg, 1989).

<sup>‡</sup> Score and sub-scales derived from Strengths and Difficulties Questionnaire (Goodman, 1999).

APPENDIX D  
Results relating to application of the “Adolescent Attitudes to Adolescent Parenthood Scale”

Table D.1 continued...

		MALES					FEMALES				
		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=366	SA <sup>Δ</sup> n=115	p	% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=656	SA <sup>Δ</sup> n=458	p
Total n=1595											
				Mean (SD)	Mean (SD)				Mean (SD)	Mean (SD)	
Importance of friendships	Less	18	12	1.15 (1.18)	0.56 (0.84)	0.081	5	17	1.76 (1.41)	0.43 (1.43)	<0.001
	More	80	88	1.21 (1.17)	1.06 (1.30)	0.290	94	82	1.75 (1.24)	1.28 (1.50)	<0.001
Friends mainly from school	No	14	23	1.24 (1.36)	1.19 (1.52)	0.890	14	37	1.90 (1.34)	0.95 (1.50)	<0.001
	Yes	86	77	1.19 (1.13)	0.94 (1.18)	0.073	86	62	1.73 (1.23)	1.23 (1.52)	<0.001
Friends of both sexes	No	37	25	1.09 (1.08)	0.88 (1.35)	0.372	41	24	1.76 (1.31)	0.94 (1.55)	<0.001
	Yes	63	75	1.26 (1.21)	1.04 (1.24)	0.152	59	75	1.75 (1.21)	1.19 (1.51)	<0.001
Friends mainly of same sex	No	64	77	1.28 (1.22)	1.05 (1.34)	0.138	51	77	1.69 (1.26)	1.13 (1.53)	<0.001
	Yes	36	23	1.03 (1.04)	0.83 (0.99)	0.340	49	22	1.82 (1.23)	1.11 (1.51)	<0.001
Friends mainly of opposite sex	No	90	81	1.22 (1.16)	1.08 (1.24)	0.297	93	79	1.75 (1.24)	1.21 (1.57)	<0.001
	Yes	10	19	0.96 (1.17)	0.67 (1.33)	0.393	7	21	1.80 (1.32)	0.80 (1.25)	<0.001
Friends mainly of same age	No	24	33	1.27 (1.26)	0.71 (1.41)	0.029	21	46	1.81 (1.36)	1.05 (1.41)	<0.001
	Yes	76	67	1.17 (1.13)	1.14 (1.16)	0.840	79	54	1.74 (1.22)	1.19 (1.60)	<0.001
Friends mainly older	No	85	76	1.21 (1.14)	1.05 (1.29)	0.282	82	55	1.76 (1.25)	1.27 (1.57)	<0.001
	Yes	15	24	1.13 (1.28)	0.83 (1.17)	0.306	18	45	1.73 (1.26)	0.95 (1.44)	<0.001
Friends mainly younger	No	89	88	1.23 (1.15)	1.04 (1.29)	0.166	93	93	1.76 (1.24)	1.14 (1.53)	<0.001
	Yes	11	12	0.90 (1.19)	0.67 (1.06)	0.532	7	6	1.67 (1.34)	0.92 (1.34)	0.022
<b>ROMANTIC RELATIONSHIPS</b>											
Relationship status	Single/casual	95	81	1.20 (1.17)	1.02 (1.23)	0.199	96	50	1.77 (1.24)	1.31 (1.53)	<0.001
	Committed relationship/engaged	3	16	1.09 (1.07)	0.95 (1.46)	0.782	3	50	1.41 (1.37)	0.93 (1.49)	0.152
Current relationship status/duration	Casual partners/single	83	60	1.24 (1.17)	1.05 (1.24)	0.891	84	28	1.76 (1.23)	1.36 (1.61)	0.002
	Time with partner < 1 year	11	29	0.90 (1.11)	0.94 (1.40)	0.657	13	43	1.71 (1.36)	1.21 (1.36)	0.005
	Time with partner ≥ 1 year	2	8	0.77 (0.84)	0.98 (0.97)	0.232	1	28	1.51 (1.12)	0.68 (1.58)	0.128
Age of partner (note missing cases)	≤13	3	3	0.93 (1.02)	1.34 (1.57)	0.558	1	1	1.05 (0.28)	1.99 (1.11)	0.051

APPENDIX D  
Results relating to application of the "Adolescent Attitudes to Adolescent Parenthood Scale"

Table D.1 continued...

TABLE D12 CONTINUED												
MALES							FEMALES					

**Table D.2**

**Rasch Mean AAAP Scale Locations (Comparisons by Duration of Sexual Activity for Females)**

<sup>Δ</sup>SA = sexually active (vaginal intercourse), data relating to the age at sexual debut was missing for 82 females

Note: % do not sum to 100% if missing data

				FEMALES		
		% <sub>SA</sub> <sup>Δ</sup> <1yr	% <sub>SA</sub> <sup>Δ</sup> ≥1yr	SA <sup>Δ</sup> <1yr	SA <sup>Δ</sup> ≥1yr	p
Total n=376		r		n=90	n=277	
				Mean (SD)	Mean (SD)	
All				1.47 (1.33)	0.87 (1.57)	0.001
GENERAL						
Age	≤14	26	4	1.17 (1.20)	0.84 (1.26)	0.459
	≥15	74	96	1.57 (1.36)	0.87 (1.58)	0.001
ATSI	No	96	92	1.48 (1.35)	0.93 (1.59)	0.004
	Yes	4	8	1.24 (0.55)	0.09 (1.07)	0.049
English spoken at home	No	1	<1	-0.54 (n=1)	2.20 (n=1)	-
	Yes	99	100	1.49 (1.32)	0.86 (1.57)	0.001
Religious affiliation	None	45	59	1.47 (1.38)	0.66 (1.52)	0.002
	Christianity	53	37	1.51 (1.29)	1.09 (1.57)	0.106
	Other	2	3	0.39 (0.65)	2.07 (1.71)	0.217
FAMILY BACKGROUND						
Mother working	No	23	30	1.29 (1.54)	0.77 (1.60)	0.177
	Yes	73	59	1.58 (1.27)	1.01 (1.55)	0.009
Father working	No	4	11	0.97 (0.58)	0.52 (1.58)	0.578
	Yes	81	69	1.59 (1.35)	1.04 (1.59)	0.009
Mother's highest education level	Unsure	17	15	1.17 (1.20)	0.54 (1.39)	0.116
	Some school	22	29	1.23 (1.22)	0.65 (1.56)	0.124
	TAFE/trade/completed high school	41	38	1.69 (1.32)	1.15 (1.57)	0.058
	University	18	13	1.63 (1.58)	1.20 (1.60)	0.361
Father's highest education level	Unsure	16	20	1.06 (0.93)	0.55 (1.48)	0.216
	Some school	22	22	1.37 (1.43)	0.69 (1.32)	0.053
	TAFE/trade/completed high school	34	31	1.51 (1.24)	1.06 (1.79)	0.189
	University	19	14	1.88 (1.66)	1.35 (1.54)	0.238
ALCOHOL AND/OR OTHER DRUG USE						
Mother smoked ever	No	62	51	1.46 (1.29)	1.17 (1.50)	0.187
	Yes	37	45	1.48 (1.42)	0.62 (1.58)	0.005
Father smoked ever	No	55	44	1.64 (1.39)	1.07 (1.48)	0.019
	Yes	35	43	1.22 (1.26)	0.70 (1.68)	0.100
Mother drinks alcohol	No/occasional	85	74	1.46 (1.33)	0.80 (1.53)	0.001
	Yes	14	20	1.52 (1.39)	1.39 (1.57)	0.786
Father drinks alcohol	No/occasional	65	53	1.51 (1.34)	0.85 (1.64)	0.006
	Yes	27	35	1.39 (1.37)	0.97 (1.50)	0.208
Ever smoked	No	40	16	1.38 (1.50)	0.92 (1.54)	0.177
	Yes	60	84	1.52 (1.21)	0.85 (1.58)	0.003
Ever drunk alcohol	No	3	2	0.53 (1.47)	0.02 (1.50)	0.658
	Yes	96	97	1.50 (1.33)	0.87 (1.57)	0.001

Table D.2 continued...

				FEMALES		
		% <sub>SA</sub> <sup>Δ</sup> <1yr	% <sub>SA</sub> <sup>Δ</sup> ≥1yr	SA <sup>Δ</sup> <1yr	SA <sup>Δ</sup> ≥1yr	p
Total n=376			r	n=90	n=277	
				Mean (SD)	Mean (SD)	
Ever used illicit drugs	No	72	52	1.46 (1.31)	0.70 (1.52)	0.001
	Yes	28	48	1.49 (1.38)	1.04 (1.61)	0.191
Alcohol/drug problems in family	No	72	54	1.43 (1.34)	0.86 (1.53)	0.009
	Yes	27	45	1.55 (1.33)	0.93 (1.60)	0.068
Alcohol/drug problems with close friend or boy/girlfriend	No	59	45	1.42 (1.37)	0.83 (1.55)	0.015
	Yes	41	54	1.53 (1.27)	0.92 (1.58)	0.029
Parents would find out if drank alcohol	No	52	56	1.47 (1.43)	1.04 (1.59)	0.090
	Yes	41	31	1.54 (1.19)	0.62 (1.46)	0.001
FAMILY FUNCTIONING						
Lives with both parents	No	53	69	1.37 (1.31)	0.72 (1.60)	0.009
	Yes	47	31	1.57 (1.35)	1.18 (1.45)	0.145
Family supportive	No	6	5	1.02 (1.53)	0.93 (1.62)	0.907
	Yes	85	86	1.43 (1.32)	0.88 (1.54)	0.005
Ask parents for help with personal problems	No	29	20	1.07 (1.35)	1.11 (1.36)	0.906
	Yes	70	76	1.62 (1.30)	0.82 (1.62)	<0.001
Family rules are clear	No	20	31	1.31 (1.73)	0.76 (1.64)	0.190
	Yes	80	69	1.50 (1.21)	0.91 (1.54)	0.003
Parents control everything	No	49	66	1.58 (1.36)	0.91 (1.57)	0.009
	Yes	47	26	1.45 (1.26)	0.99 (1.54)	0.093
Parents ask my thoughts before family decisions affecting me are made	No	39	32	1.23 (1.34)	0.81 (1.33)	0.118
	Yes	60	64	1.62 (1.32)	0.96 (1.64)	0.006
Parents overprotect	No	63	74	1.57 (1.28)	0.89 (1.54)	0.002
	Yes	30	21	1.30 (1.44)	1.00 (1.59)	0.406
NEIGHBOURHOOD						
Number of homes lived in since birth	1-3	46	33	1.48 (1.41)	1.29 (1.50)	0.473
	≥4	52	65	1.46 (1.28)	0.67 (1.57)	0.002
Years at current address	≤1 year	24	37	1.59 (1.47)	0.64 (1.56)	0.010
	>1 year	74	60	1.39 (1.29)	1.04 (1.58)	0.098
	<1 year	22	34	1.47 (1.38)	0.67 (1.59)	0.039
	1-5 years	39	34	1.56 (1.25)	0.93 (1.59)	0.034
	>5 years	38	31	1.30 (1.40)	1.05 (1.55)	0.408
Safe neighbourhood	Disagree/unsure	26	26	1.76 (1.36)	0.67 (1.42)	0.001
	Agree	74	73	1.36 (1.31)	0.94 (1.62)	0.050
Clean neighbourhood	Disagree/unsure	17	24	2.11 (1.23)	0.77 (1.46)	0.001
	Agree	82	75	1.35 (1.31)	0.91 (1.61)	0.030
Theft/vandalism in neighbourhood	No/unsure	23	20	1.71 (1.27)	1.02 (1.82)	0.117
	Yes	77	79	1.39 (1.34)	0.83 (1.50)	0.005

Table D.2 continued...

				FEMALES		p
		% <sub>SA</sub> <sup>Δ</sup> <1yr	% <sub>SA</sub> <sup>Δ</sup> ≥1yr	SA <sup>Δ</sup> <1yr	SA <sup>Δ</sup> ≥1yr	
Total n=376		r		n=90	n=277	
				Mean (SD)	Mean (SD)	
Violence (any) in neighbourhood	No/unsure	48	45	1.52 (1.24)	1.01 (1.65)	0.064
	Yes	52	53	1.42 (1.41)	0.76 (1.51)	0.008
Domestic violence in neighbourhood	No/unsure	66	58	1.55 (1.31)	0.98 (1.58)	0.013
	Yes	34	40	1.31 (1.36)	0.72 (1.56)	0.058
Participated in sport/recreation activities during last 12 months	No	40	54	1.23 (1.42)	0.72 (1.62)	0.080
	Yes	60	45	1.62 (1.25)	1.06 (1.50)	0.015
Participated in youth group activities during last 12 months	No	71	83	1.45 (1.20)	0.94 (1.57)	0.015
	Yes	28	16	1.51 (1.66)	0.56 (1.55)	0.017
<b>SCHOOL</b>						
Ever repeated a year at school	No	95	88	1.42 (1.31)	0.89 (1.56)	0.004
	Yes	4	11	2.29 (1.77)	0.85 (1.66)	0.114
Ever skipped school	No	42	18	1.47 (1.37)	1.31 (1.73)	0.644
	Yes	35	23	1.38 (1.36)	0.99 (1.42)	0.195
<b>PSYCHOLOGICAL SCALES</b>						
Low personal self-efficacy <sup>*</sup>	Normal	39	37	1.55 (1.36)	1.14 (1.79)	0.215
	Borderline/Abnormal	43	41	1.40 (1.27)	0.74 (1.33)	0.007
Low self-esteem <sup>†</sup>	No	70	70	1.67 (1.27)	0.87 (1.62)	<0.001
	Yes	24	21	1.01 (1.33)	1.03 (1.48)	0.950
SDQ Emotional difficulties <sup>‡</sup>	Normal	75	70	1.63 (1.29)	0.85 (1.61)	<0.001
	Borderline/abnormal	24	29	1.06 (1.31)	0.91 (1.47)	0.648
SDQ Conduct problems <sup>‡</sup>	Normal	68	68	1.54 (1.29)	0.85 (1.59)	0.002
	Borderline/abnormal	31	31	1.38 (1.37)	0.92 (1.52)	0.145
SDQ Hyperactivity <sup>‡</sup>	Normal	63	61	1.58 (1.43)	0.76 (1.62)	0.001
	Borderline/abnormal	35	39	1.33 (1.05)	1.04 (1.48)	0.296
SDQ Peer problems <sup>‡</sup>	Normal	80	73	1.53 (1.32)	1.01 (1.61)	0.012
	Borderline/abnormal	19	27	1.32 (1.30)	0.49 (1.39)	0.023
SDQ Prosocial scale <sup>‡</sup>	Normal	87	84	1.49 (1.29)	0.86 (1.55)	0.001
	Borderline/abnormal	12	16	1.49 (1.53)	0.94 (1.69)	0.327
SDQ Total difficulties <sup>‡</sup>	Normal	66	59	1.71 (1.28)	0.90 (1.62)	0.001
	Borderline/abnormal	33	41	1.06 (1.27)	0.82 (1.50)	0.416
<b>FRIENDSHIPS</b>						
Experienced negative treatment by others	No	39	37	1.55 (1.36)	1.14 (1.79)	0.215
	Yes	43	41	1.40 (1.27)	0.74 (1.33)	0.007

\* Score derived from Cowen's Self-Efficacy Scale (Cowen, et al., 1991).

† Score derived from Rosenberg's Self-Esteem Scale (Rosenberg, 1989).

‡ Score and sub-scales derived from Strengths and Difficulties Questionnaire (Goodman, 1999).

Table D.2 continued...

				FEMALES		p
		% <sub>SA</sub> <sup>Δ</sup> <1yr	% <sub>SA</sub> <sup>Δ</sup> ≥1yr	SA <sup>Δ</sup> <1yr	SA <sup>Δ</sup> ≥1yr	
Total n=376		r		n=90	n=277	
				Mean (SD)	Mean (SD)	
Any close friends	No	1	2	-0.42 (n=1)	1.01 (2.02)	0.541
	Yes	99	96	1.49 (1.32)	0.86 (1.57)	0.001
Importance of friendships	Less	8	24	1.52 (1.69)	0.29 (1.35)	0.028
	More	91	74	1.47 (1.31)	1.06 (1.60)	0.035
Friends mainly from school	No	23	44	1.51 (1.21)	0.75 (1.52)	0.033
	Yes	77	55	1.45 (1.36)	0.95 (1.61)	0.023
Friends of both sexes	No	25	24	1.38 (1.49)	0.61 (1.55)	0.041
	Yes	75	75	1.49 (1.28)	0.94 (1.57)	0.008
Friends mainly of same sex	No	75	80	1.40 (1.26)	0.88 (1.59)	0.012
	Yes	25	19	1.65 (1.53)	0.79 (1.50)	0.025
Friends mainly of opposite sex	No	81	75	1.60 (1.36)	0.92 (1.65)	0.002
	Yes	19	24	0.91 (1.01)	0.69 (1.31)	0.494
Friends mainly of same age	No	44	48	1.56 (1.40)	0.82 (1.40)	0.003
	Yes	56	51	1.39 (1.27)	0.91 (1.72)	0.066
Friends mainly older	No	56	49	1.63 (1.35)	0.98 (1.66)	0.012
	Yes	44	50	1.26 (1.28)	0.75 (1.48)	0.048
Friends mainly younger	No	94	93	1.47 (1.31)	0.90 (1.60)	0.002
	Yes	6	6	1.33 (1.64)	0.35 (0.89)	0.079
<b>ROMANTIC RELATIONSHIPS</b>						
Relationship status	Single/casual	46	42	1.55 (1.34)	1.06 (1.61)	0.073
	Committed relationship/engaged	54	58	1.39 (1.32)	0.73 (1.53)	0.006
Current relationship status/duration	Casual partners/single	22	25	1.68 (1.45)	1.17 (1.69)	0.216
	Time with partner < 1 year	55	39	1.50 (1.19)	0.91 (1.42)	0.011
	Time with partner ≥1 years	24	35	1.18 (1.50)	0.55 (1.60)	0.093
Age of partner (note missing cases)	≤15	17	3	1.70 (0.92)	0.90 (1.06)	0.070
	≥16	59	71	1.35 (1.38)	0.75 (1.54)	0.010
<b>SEXUAL BEHAVIOUR</b>						
Sexual attraction	Heterosexual	89	84	1.50 (1.32)	0.94 (1.56)	0.004
	Bi- or homosexual	8	12	1.65 (1.04)	0.72 (1.60)	0.145
	Not sure	2	3	-0.93 (0.55)	-0.18 (1.31)	0.471
Age of onset of kissing	≤13	55	55	1.54 (1.32)	0.91 (1.54)	0.009
	14-15	32	37	1.52 (1.34)	0.70 (1.64)	0.014
	≥16	13	7	1.01 (1.34)	1.32 (1.25)	0.520
	≤15	87	92	1.53 (1.32)	0.82 (1.58)	<0.001
	≥16	13	7	1.01 (1.34)	1.32 (1.25)	0.520
Age of onset of genital touching	≤13	22	28	1.33 (1.42)	0.80 (1.36)	0.121
	14-15	52	58	1.58 (1.22)	0.84 (1.65)	0.005
	≥16	22	12	1.27 (1.60)	1.19 (1.60)	0.868
	≤15	73	86	1.51 (1.27)	0.83 (1.56)	0.001



Table D.2 continued...

				FEMALES		p
				$%_{SA}^{\Delta} < 1yr$	$%_{SA}^{\Delta} \geq 1yr$	
				r		
Total n=376				SA <sup>Δ</sup> <1yr n=90	SA <sup>Δ</sup> ≥1yr n=277	
				Mean (SD)	Mean (SD)	
				≥16	22	12
				1.27 (1.60)	1.19 (1.60)	0.868
Age of onset of sexual activity- oral sex				≤13	6	10
				1.47 (1.07)	0.43 (1.40)	0.098
				14-15	43	51
				1.38 (1.26)	0.82 (1.58)	0.042
				≥16	35	27
				1.76 (1.51)	1.11 (1.65)	0.053
				≤15	49	61
				1.39 (1.23)	0.76 (1.55)	0.011
				≥16	35	27
				1.76 (1.51)	1.11 (1.65)	0.053
Age of onset of sexual activity - vaginal sex				≤13	6	17
				1.58 (1.00)	0.58 (1.28)	0.072
				14-15	47	63
				1.21 (1.19)	0.81 (1.64)	0.135
				≥16	46	20
				1.71 (1.46)	1.27 (1.52)	0.144
				≤15	54	80
				1.25 (1.17)	0.77 (1.57)	0.039
				≥16	46	20
				1.71 (1.46)	1.27 (1.53)	0.144
Age of onset of sexual activity - anal sex				≤13	2	1
				2.04 (0.23)	0.40 (2.06)	0.366
				14-15	3	12
				0.74 (1.00)	-0.09 (1.27)	0.279
				≥16	8	17
				1.19 (1.77)	0.83 (1.40)	0.546
				≤15	5	13
				1.26 (1.01)	-0.05 (1.32)	0.040
				≥16	8	17
				1.19 (1.77)	0.83 (1.40)	0.546
Age at sexual debut (oral/vaginal/anal sex)				≤13	10	20
				1.39 (0.99)	0.60 (1.30)	0.085
				14-15	53	64
				1.35 (1.23)	0.85 (1.61)	0.044
				≥16	38	16
				1.65 (1.52)	1.29 (1.67)	0.325
				≤15	62	84
				1.35 (1.19)	0.79 (1.54)	0.009
				≥16	38	16
				1.65 (1.52)	1.29 (1.67)	0.325
Number of oral sex partners in previous year				1	63	48
				1.48 (1.39)	0.76 (1.60)	0.003
				2	13	18
				1.40 (1.58)	0.95 (1.58)	0.376
				≥3	10	24
				1.62 (1.29)	1.19 (1.44)	0.400
Number of people had oral sex but not intercourse with in last year				1	59	55
				1.31 (1.33)	0.88 (1.61)	0.003
				2	12	13
				1.69 (1.61)	0.96 (1.29)	0.376
				≥3	5	11
				2.17 (1.41)	1.02 (1.40)	0.400
Number of people had vaginal intercourse with in last year				1	68	48
				1.50 (1.40)	0.71 (1.62)	0.001
				2	12	18
				1.23 (1.10)	0.96 (1.56)	0.592
				≥3	12	28
				1.66 (1.13)	1.08 (1.40)	0.194
Number of people had any form of sexual intercourse with in last year				1	65	46
				1.46 (1.38)	0.63 (1.58)	0.001
				2	22	18
				1.40 (1.37)	0.77 (1.60)	0.592
				≥3	13	34
				1.59 (1.10)	1.26 (1.45)	0.192
Ever had unwanted sex				No	69	53
				1.44 (1.37)	0.75 (1.59)	0.003
				Yes	25	42
				1.67 (1.13)	0.99 (1.55)	0.049
Reasons for unwanted sex				Drunk or high	13	22
				1.74 (0.92)	1.15 (1.64)	0.235
				Person I had sex with thought I should	11	17
				1.54 (1.29)	0.68 (1.46)	0.091
				Friends thought I should		

Table D.2 continued...

				FEMALES		p
		% <sub>SA</sub> <sup>Δ</sup> <sub>&lt;1yr</sub>	% <sub>SA</sub> <sup>Δ</sup> <sub>≥1yr</sub>	SA <sup>Δ</sup> <sub>&lt;1yr</sub>	SA <sup>Δ</sup> <sub>≥1yr</sub>	
Total n=376		r		n=90	n=277	
				Mean (SD)	Mean (SD)	
Drunk or high last time had sex	No	81	81	1.43 (1.35)	0.78 (1.61)	0.002
	Yes	13	14	1.94 (0.97)	1.29 (1.36)	0.134
Discussed avoiding pregnancy before last sexual encounter	No	52	66	1.66 (1.25)	0.78 (1.60)	0.001
	Yes	41	27	1.24 (1.33)	1.08 (1.44)	0.560
Condom use in previous 12 months	Always	40	17	1.68 (1.33)	1.24 (1.49)	0.163
	Sometimes	39	61	1.37 (1.23)	0.82 (1.53)	0.043
	Never	12	16	1.47 (1.66)	0.61 (1.76)	0.148
Ever used condoms	No	25	26	1.37 (1.38)	0.46 (1.39)	0.007
	Yes	75	74	1.50 (1.32)	1.01 (1.61)	0.023
Ever used oral contraceptives	No	75	59	1.49 (1.28)	0.88 (1.53)	0.004
	Yes	25	41	1.39 (1.48)	0.85 (1.62)	0.141
Ever used withdrawal/rhythm method	No	84	60	1.35 (1.29)	0.73 (1.57)	0.003
	Yes	16	40	2.06 (1.40)	1.07 (1.55)	0.021
Ever used oral/anal sex to prevent pregnancy	No	91	79	1.47 (1.26)	0.86 (1.59)	0.002
	Yes	9	21	1.41 (2.02)	0.87 (1.51)	0.371
Ever used morning after pill	No	88	81	1.42 (1.32)	0.73 (1.58)	<0.001
	Yes	12	19	1.79 (1.42)	1.43 (1.42)	0.443
Ever used Depo Provera/IUD/Implanon	No	97	92	1.48 (1.34)	0.89 (1.58)	0.002
	Yes	3	8	1.05 (0.30)	0.60 (1.38)	0.582
Never used contraception	No	87	89	1.46 (1.31)	0.93 (1.57)	0.007
	Yes	13	11	1.50 (1.47)	0.32 (1.46)	0.023
<b>PREGNANCY</b>						
Would like to become a parent soon	Yes	13	18	0.06 (1.24)	-0.18 (1.08)	0.517
	No	72	56	1.85 (1.21)	1.80 (1.28)	0.777

**Table D.3**  
**AAAP Scale Adjusted Univariate Linear Regression Models (Comparisons by Sexual Activity Status)**

		B	SE(B)	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>				<b>0.075</b>		<b>&lt;0.001</b>
Age		0.047	0.033			
ATSI		-0.437	0.157			
+Female – sexually active <1year		-0.329	0.148			
+Female – sexually active ≥1year		-0.971	0.120			
+Male – sexually active		-0.738	0.132			
+Male – not sexually active		-0.542	0.085			
+Female – sexually active (duration data missing)		-0.144	0.151			
<b>Plus (added individually):</b>						
<i>General</i>						
English spoken at home		-0.449	0.377	0.078	0.001	0.234
Religious affiliation = Christianity		0.217	0.067	0.082	0.006	0.001
<i>Family background</i>						
Mother working		0.018	0.082	0.072	0.000	0.827
Father working		0.294	0.144	0.075	0.003	0.041
Mother's highest education level	<i>Some school</i>	-0.014	0.106	0.077	0.002	0.058
	<i>Finish school/TAFE</i>	0.180	0.088	0.077	0.000	0.633
	<i>University</i>	0.271	0.093	0.082	0.005	0.004
Father's highest education level	<i>Some school</i>	-0.251	0.108	0.073	0.001	0.324
	<i>Finish school/TAFE</i>	-0.274	0.089	0.080	0.008	0.002
	<i>University</i>	0.267	0.103	0.115	0.009	0.001
<i>Alcohol and/or other drug use</i>						
Mother smoked ever		-0.176	0.084	0.073	0.003	0.036
Father smoked ever		-0.127	0.079	0.074	0.002	0.107
Mother drinks alcohol		0.112	0.088	0.067	0.001	0.204
Father drinks alcohol		-0.005	0.073	0.072	0.000	0.943
Ever smoked		-0.170	0.084	0.078	0.002	0.042
Ever drunk alcohol		-0.014	0.106	0.081	0.000	0.899
Ever used illicit drugs		-0.002	0.102	0.075	0.000	0.983
Alcohol/drug problems in family		-0.080	0.089	0.073	0.000	0.365
Alcohol/drug problems with close friend		0.029	0.082	0.073	0.000	0.724
Parents would find out if drank alcohol		0.064	0.069	0.067	0.001	0.357
<i>Family functioning</i>						
Lives with both parents		0.108	0.076	0.076	0.001	0.158
Family supportive		0.327	0.193	0.075	0.002	0.091
Ask parents for help with personal problems		0.091	0.081	0.072	0.001	0.260
Family rules are clear		0.209	0.085	0.079	0.003	0.014
Parents control everything		0.011	0.068	0.070	0.000	0.873
Parents ask my thoughts before family decisions about me are made		0.152	0.074	0.073	0.003	0.040
Parents overprotect		-0.143	0.075	0.073	0.002	0.057
<i>Neighbourhood</i>						
Number homes lived in since birth						
(>7 years is the reference category)	<i>1-3</i>	0.063	0.094	0.075	0.001	0.239
	<i>4-6</i>	0.026	0.101	0.075	0.000	0.794
Years at current address						
(>5 years is the reference category)	<i>&lt;1</i>	0.002	0.101	0.075	0.000	0.682
	<i>1-5</i>	0.091	0.072	0.076	0.001	0.209
Safe neighbourhood		-0.071	0.088	0.076	0.000	0.422
Clean neighbourhood		0.037	0.087	0.075	0.000	0.669
Theft/vandalism in neighbourhood		0.025	0.073	0.075	0.000	0.734
Violence (any) in neighbourhood		-0.095	0.073	0.076	0.001	0.193
Domestic violence in neighbourhood		-0.122	0.083	0.076	0.001	0.143

# APPENDIX D

## Results relating to application of the "Adolescent Attitudes to Adolescent Parenthood Scale"

Table D.3 continued...

	B	SE(B)	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
Participated in sport/recreation activities during last 12 months	0.180	0.077	0.079	0.003	0.019
Participated in youth group activities during last 12 months	-0.064	0.073	0.075	0.000	0.378
<i>School</i>					
Ever skipped school	-0.230	0.082	0.060	0.005	0.005
<i>Psychological scales</i>					
Low personal self-efficacy <sup>*</sup>	-0.396	0.071	0.090	0.022	<0.001
SDQ Emotional difficulties <sup>†</sup>	-0.152	0.089	0.077	0.002	0.089
SDQ Conduct problems <sup>†</sup>	-0.204	0.079	0.079	0.004	0.010
SDQ Hyperactivity <sup>†</sup>	-0.126	0.070	0.077	0.002	0.074
SDQ Peer problems <sup>†</sup>	-0.292	0.085	0.082	0.007	0.001
SDQ Prosocial <sup>†</sup>	-0.199	0.084	0.078	0.003	0.018
SDQ Prosocial (males) <sup>†</sup>	-0.475	0.168	0.083	0.005	0.005
SDQ Total difficulties <sup>†</sup>	-0.240	0.077	0.081	0.006	0.002
<i>Friendships</i>					
Experienced negative treatment by others	-0.267	0.199	0.077	0.001	0.181
Any close friends	-0.021	0.195	0.076	0.000	0.915
Importance of friendships	0.291	0.103	0.079	0.005	0.005
Friends mainly from school	-0.003	0.082	0.075	0.000	0.969
Friends of both sexes	0.120	0.069	0.077	0.002	0.084
Friends mainly of same sex	-0.035	0.070	0.075	0.000	0.615
Friends mainly of opposite sex	-0.204	0.101	0.077	0.002	0.042
Friends mainly of same age	0.021	0.073	0.075	0.000	0.778
Friends mainly older	-0.102	0.079	0.076	0.001	0.198
<i>Romantic relationships</i>					
Relationship status (Committed)	-0.293	0.106	0.079	0.004	0.006
Current relationship status/duration:					
<1 year	-0.129	0.089	0.075	0.000	0.850
≥1 year	-0.483	0.132	0.083	0.008	<0.001
Age of partner (note missing cases)	-0.007	0.023	0.080	0.000	0.761
<i>Sexual behaviour</i>					
Sexual attraction (Heterosexual)	0.256	0.119	0.076	0.003	0.033
Age at sexual debut:					
≤15	0.287	0.234	0.076	0.000	0.398
≥16	0.609	0.286	0.078	0.003	0.033

Note: Each variable entered individually in addition to the Base model. Variables were not tested if they were not found to be statistically significant in Table D.1

Reference category: Female – not sexually active

<sup>\*</sup> Score derived from Cowen's Self-Efficacy Scale (Cowen, et al., 1991).

<sup>†</sup> Score and sub-scales derived from Strengths and Difficulties Questionnaire (Goodman, 1999).

Table D.4

**AAAP Scale Adjusted Univariate Linear Regression Models (Comparisons by Sexual Activity Status for Females Only)**

		B	SE(B)	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>				<b>0.081</b>		<b>&lt;0.001</b>
Age		0.049	0.039			
ATSI		-0.617	0.210			
+Female – sexually active <1year		-0.327	0.155			
+Female – sexually active ≥1year		-0.966	0.132			
+Female – sexually active (duration data missing)		-0.121	0.158			
<b>Plus (added individually):</b>						
<i>General</i>						
English spoken at home		-0.607	0.479	0.084	0.001	0.205
Religious affiliation = Christianity		0.297	0.083	0.092	0.011	<0.001
<i>Family background</i>						
Mother working		-0.024	0.101	0.071	0.000	0.810
Father working		0.278	0.167	0.073	0.003	0.098
Mother's highest education level	<i>Some school</i>	0.127	0.129	0.082	0.001	0.430
	<i>Finish school/TAFE</i>	0.276	0.112	0.083	0.001	0.242
	<i>University</i>	0.307	0.118	0.088	0.006	0.010
Father's highest education level	<i>Some school</i>	-0.375	0.130	0.070	0.003	0.100
	<i>Finish school/TAFE</i>	-0.336	0.110	0.081	0.011	0.002
	<i>University</i>	0.375	0.130	0.094	0.014	0.001
<i>Alcohol and/or other drug use</i>						
Mother smoked ever		-0.226	0.101	0.076	0.004	0.026
Father smoked ever		-0.168	0.096	0.078	0.003	0.081
Mother drinks alcohol		0.166	0.108	0.070	0.002	0.126
Father drinks alcohol		0.027	0.091	0.075	0.000	0.766
Ever smoked		-0.189	0.104	0.084	0.003	0.070
Ever drunk alcohol		-0.067	0.141	0.086	0.000	0.632
Ever used illicit drugs		0.036	0.119	0.081	0.000	0.764
Alcohol/drug problems in family		-0.015	0.106	0.077	0.000	0.887
Alcohol/drug problems with close friend		-0.042	0.096	0.078	0.000	0.661
Parents would find out if drank alcohol		0.103	0.086	0.073	0.001	0.232
<i>Family functioning</i>						
Lives with both parents		0.180	0.094	0.084	0.003	0.056
Family supportive		0.245	0.226	0.080	0.001	0.279
Ask parents for help with personal problems		0.087	0.100	0.077	0.001	0.385
Family rules are clear		0.157	0.101	0.083	0.002	0.121
Parents control everything		0.037	0.086	0.071	0.000	0.665
Parents ask my thoughts before family decisions about me are made		0.168	0.091	0.075	0.003	0.066
Parents overprotect		-0.185	0.092	0.077	0.003	0.045
<i>Neighbourhood</i>						
Number homes lived in since birth						
(>7 years is the reference category)	<i>1-3</i>	0.073	0.116	0.080	0.001	0.194
	<i>4-6</i>	-0.057	0.124	0.080	0.000	0.649
Years at current address						
(>5 years is the reference category)	<i>&lt;1</i>	0.002	0.118	0.080	0.000	0.721
	<i>1-5</i>	0.090	0.091	0.081	0.001	0.325
Safe neighbourhood		-0.056	0.107	0.082	0.000	0.598
Clean neighbourhood		-0.009	0.109	0.081	0.000	0.937
Theft/vandalism in neighbourhood		-0.23	0.091	0.080	0.000	0.804
Violence (any) in neighbourhood		-0.100	0.091	0.080	0.001	0.269
Domestic violence in neighbourhood		-0.163	0.103	0.081	0.002	0.115
Participated in sport/recreation activities during last 12 months		0.210	0.091	0.085	0.004	0.021
Participated in youth group activities during last 12 months		-0.092	0.092	0.080	0.001	0.318
<i>School</i>						
Ever skipped school		-0.252	0.106	0.037	0.006	0.018

## APPENDIX D

## Results relating to application of the "Adolescent Attitudes to Adolescent Parenthood Scale"

Table D.4 continued...

		B	SE(B)	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<i>Psychological scales</i>						
Low personal self-efficacy <sup>*</sup>		-0.350	0.088	0.085	0.016	<0.001
SDQ Emotional difficulties <sup>†</sup>		-0.123	0.100	0.082	0.001	0.220
SDQ Conduct problems <sup>†</sup>		-0.140	0.100	0.082	0.002	0.160
SDQ Hyperactivity <sup>†</sup>		-0.134	0.086	0.083	0.002	0.122
SDQ Peer problems <sup>†</sup>		-0.291	0.107	0.087	0.006	0.007
SDQ Prosocial <sup>†</sup>		0.106	0.117	0.081	0.000	0.893
SDQ Total difficulties <sup>†</sup>		-0.262	0.093	0.087	0.006	0.005
<i>Friendships</i>						
Experienced negative treatment by others		-0.617	0.246	0.086	0.005	0.012
Any close friends		-0.186	0.259	0.082	0.000	0.474
Importance of friendships		0.397	0.140	0.087	0.007	0.005
Friends mainly from school		0.036	0.100	0.081	0.000	0.719
Friends of both sexes		0.094	0.086	0.082	0.001	0.274
Friends mainly of same sex		0.065	0.086	0.081	0.000	0.455
Friends mainly of opposite sex		-0.163	0.124	0.082	0.001	0.192
Friends mainly of same age		0.014	0.091	0.081	0.000	0.876
Friends mainly older		-0.097	0.094	0.082	0.001	0.303
<i>Romantic relationships</i>						
Relationship status (Committed)		-0.343	0.121	0.087	0.007	0.005
Current relationship status/duration:	<1 year	-0.094	0.109	0.082	0.000	0.566
	≥1 year	-0.517	0.152	0.092	0.011	0.001
Age of partner		-0.020	0.026	0.088	0.001	0.431
<i>Sexual behaviour</i>						
Sexual attraction (Heterosexual)		0.277	0.131	0.084	0.004	0.035
Age at sexual debut:	≤15	0.312	0.336	0.082	0.001	0.242
	≥16	0.368	0.378	0.084	0.002	0.092
<i>Other</i>						
Recruitment site	Termination clinic	0.085	0.165	0.116	0.035	<0.001
	Antenatal clinic	-1.946	0.199	0.186	0.070	<0.001
	Secondary school (sexually active)*					
Previous history of a termination**		1.133	0.161	0.158	0.092	<0.001

Note: Each variable entered individually in addition to the Base model. Variables were not tested if they were not found to be statistically significant in Table D.1

Reference category: Female – not sexually active

\* excluded from model due to collinearity with sexual activity duration variables

\*\* pregnant girls only

\* Score derived from Cowen's Personal Self-Efficacy Scale (Cowen, et al., 1991).

† Score and sub-scales derived from Strengths and Difficulties Questionnaire (Goodman, 1999).

## APPENDIX E

*Results relating to application of the “Adolescent Attitudes to Contraception Scale”*

**Table E.1**

**Rasch Mean AAC Scale Locations (Comparisons by Sexual Activity Status within Gender)**

<sup>Δ</sup>SA = sexually active (any sexual activity i.e. oral sex and/or intercourse), sexual activity status missing for two males and three females.

Note: % do not sum to 100% if missing data

		MALES					FEMALES				
<i>Total n=1404</i>		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=331	SA <sup>Δ</sup> n=112	p	% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=508	SA <sup>Δ</sup> n=453	p
All				Mean (SD) 0.22 (0.63)	Mean (SD) 0.36 (0.56)	0.042			Mean (SD) 0.80 (0.94)	Mean (SD) 0.50 (0.60)	<0.001
<b>GENERAL</b>											
Age	≤13	20	8	0.11 (0.61)	0.11 (0.23)	0.997	19	4	0.70 (0.92)	0.67 (0.61)	0.890
	14-15	73	79	0.22 (0.60)	0.38 (0.58)	0.037	68	31	0.80 (0.95)	0.50 (0.53)	<0.001
	≥16	7	13	0.51 (0.83)	0.39 (0.55)	0.626	12	65	0.93 (0.90)	0.49 (0.62)	<0.001
ATSI	No	95	91	0.21 (0.63)	0.34 (0.54)	0.059	98	94	0.80 (0.94)	0.50 (0.60)	<0.001
	Yes	5	9	0.38 (0.64)	0.51 (0.75)	0.641	2	6	0.41 (1.01)	0.53 (0.47)	0.607
English spoken at home	No	1	<1	0.23 (0.23)	1.26 (n=1)	0.060	1	1	0.85 (1.07)	0.15 (0.43)	0.354
	Yes	98	99	0.22 (0.62)	0.35 (0.55)	0.046	99	99	0.80 (0.94)	0.50 (0.60)	<0.001
Religious affiliation	None	42	60	0.18 (0.53)	0.36 (0.53)	0.019	34	55	0.78 (0.90)	0.47 (0.62)	<0.001
	Christianity	50	33	0.25 (0.66)	0.34 (0.62)	0.414	61	42	0.81 (0.98)	0.54 (0.57)	0.001
	Other	6	7	0.21 (0.77)	0.38 (0.54)	0.578	4	3	0.89 (0.76)	0.40 (0.62)	0.065
<b>FAMILY BACKGROUND</b>											
Mother working	No	21	15	0.36 (0.79)	0.44 (0.60)	0.701	18	27	1.01 (1.24)	0.47 (0.63)	<0.001
	Yes	71	75	0.16 (0.54)	0.33 (0.57)	0.014	75	65	0.76 (0.87)	0.51 (0.58)	<0.001
Father working	No	3	7	1.08 (0.86)	0.39 (0.50)	0.058	4	9	0.60 (1.31)	0.46 (0.69)	0.602
	Yes	84	80	0.20 (0.59)	0.34 (0.58)	0.057	85	74	0.85 (0.91)	0.52 (0.59)	0.001
Mother's highest education level	Unsure	27	18	0.17 (0.56)	0.54 (0.57)	0.008	19	17	0.65 (0.81)	0.52 (0.62)	0.242
	Some school	11	16	0.24 (0.74)	0.34 (0.36)	0.577	14	27	0.99 (1.09)	0.46 (0.57)	<0.001
	TAFE/trade/completed high school	32	34	0.31 (0.66)	0.25 (0.68)	0.603	32	37	0.77 (0.93)	0.49 (0.59)	0.001
	University	28	31	0.15 (0.62)	0.36 (0.45)	0.073	33	16	0.83 (0.96)	0.57 (0.60)	0.032



APPENDIX E  
Results relating to application of the "Adolescent Attitudes to Contraception Scale"

Table E.1 continued...

		MALES					FEMALES				
<b>Total n=1404</b>		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=331	SA <sup>Δ</sup> n=112	p	% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=508	SA <sup>Δ</sup> n=453	p
				Mean (SD)	Mean (SD)				Mean (SD)	Mean (SD)	
Father's highest education level	<i>Unsure</i>	24	19	0.19 (0.48)	0.62 (0.53)	0.001	24	19	0.70 (0.92)	0.52 (0.59)	0.121
	<i>Some school</i>	12	20	0.39 (0.73)	0.40 (0.63)	0.933	12	22	1.02 (1.06)	0.41 (0.61)	<0.001
	<i>TAFE/trade/completed high school</i>	34	38	0.29 (0.72)	0.19 (0.55)	0.429	25	32	0.73 (0.89)	0.53 (0.59)	0.026
	<i>University</i>	24	21	0.11 (0.58)	0.42 (0.46)	0.021	35	16	0.87 (0.94)	0.57 (0.56)	0.010
<b>ALCOHOL AND/OR OTHER DRUG USE</b>											
Mother smoked ever	<i>No</i>	82	70	0.19 (0.58)	0.32 (0.55)	0.074	86	57	0.81 (0.96)	0.51 (0.57)	<0.001
	<i>Yes</i>	15	28	0.34 (0.75)	0.47 (0.56)	0.424	13	40	0.76 (0.78)	0.47 (0.62)	0.003
Father smoked ever	<i>No</i>	75	72	0.21 (0.65)	0.34 (0.52)	0.099	76	52	0.86 (0.94)	0.55 (0.60)	<0.001
	<i>Yes</i>	20	24	0.30 (0.60)	0.41 (0.66)	0.418	20	37	0.63 (0.92)	0.45 (0.58)	0.038
Mother drinks alcohol	<i>No/occasional</i>	81	84	0.22 (0.61)	0.33 (0.57)	0.112	82	77	0.80 (0.94)	0.52 (0.59)	<0.001
	<i>Yes</i>	16	14	0.24 (0.75)	0.48 (0.44)	0.240	16	19	0.78 (0.96)	0.44 (0.60)	0.005
Father drinks alcohol	<i>No/occasional</i>	66	66	0.24 (0.64)	0.36 (0.61)	0.132	70	57	0.81 (0.94)	0.54 (0.60)	<0.001
	<i>Yes</i>	28	30	0.22 (0.63)	0.35 (0.44)	0.268	27	33	0.82 (0.94)	0.44 (0.59)	<0.001
Ever smoked	<i>No</i>	82	56	0.23 (0.63)	0.34 (0.46)	0.206	82	27	0.86 (0.96)	0.57 (0.52)	0.002
	<i>Yes</i>	17	43	0.17 (0.54)	0.39 (0.67)	0.077	17	73	0.50 (0.80)	0.47 (0.62)	0.710
Ever drunk alcohol	<i>No</i>	16	8	0.22 (0.67)	-0.09 (0.79)	0.205	12	2	0.93 (1.16)	0.72 (0.61)	0.611
	<i>Yes</i>	73	87	0.21 (0.56)	0.39 (0.53)	0.007	79	96	0.77 (0.92)	0.50 (0.60)	<0.001
Ever used illicit drugs	<i>No</i>	94	86	0.23 (0.64)	0.37 (0.54)	0.047	95	62	0.81 (0.95)	0.58 (0.58)	<0.001
	<i>Yes</i>	6	14	0.12 (0.38)	0.27 (0.64)	0.382	5	38	0.51 (0.64)	0.37 (0.60)	0.287
Alcohol/drug problems in family	<i>No</i>	85	79	0.21 (0.64)	0.31 (0.55)	0.168	90	62	0.81 (0.95)	0.54 (0.59)	<0.001
	<i>Yes</i>	14	21	0.32 (0.56)	0.56 (0.55)	0.105	9	38	0.70 (0.86)	0.44 (0.59)	0.016
Alcohol/drug problems with close friend or boy/girlfriend	<i>No</i>	90	66	0.22 (0.63)	0.35 (0.57)	0.113	83	51	0.82 (0.97)	0.58 (0.56)	0.001
	<i>Yes</i>	9	32	0.28 (0.58)	0.40 (0.54)	0.382	17	48	0.72 (0.77)	0.41 (0.62)	<0.001

APPENDIX E  
Results relating to application of the "Adolescent Attitudes to Contraception Scale"

Table E.1 continued...

Total n=1404	MALES						FEMALES				
	% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=331	SA <sup>Δ</sup> n=112	p		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=508	SA <sup>Δ</sup> n=453	p
			Mean (SD)	Mean (SD)					Mean (SD)	Mean (SD)	
Parents would find out if drank alcohol	No	35	56	0.26 (0.56)	0.38 (0.46)	0.153	38	57	0.66 (0.78)	0.46 (0.60)	0.002
	Yes	61	39	0.23 (0.66)	0.34 (0.69)	0.282	57	34	0.86 (0.99)	0.58 (0.57)	0.001
<b>FAMILY FUNCTIONING</b>											
Lives with both parents	No	24	34	0.24 (0.49)	0.44 (0.67)	0.067	20	60	0.70 (0.90)	0.49 (0.59)	0.010
	Yes	76	66	0.22 (0.67)	0.32 (0.49)	0.235	80	40	0.82 (0.95)	0.51 (0.60)	<0.001
Family supportive	No	1	5	0.89 (1.38)	0.12 (0.32)	0.214	2	4	0.97 (0.88)	0.16 (0.72)	0.012
	Yes	95	92	0.21 (0.62)	0.37 (0.57)	0.021	92	87	0.82 (0.95)	0.52 (0.58)	<0.001
Ask parents for help with personal problems	No	18	21	0.19 (0.42)	0.33 (0.53)	0.239	19	24	0.59 (0.94)	0.41 (0.67)	0.107
	Yes	80	79	0.24 (0.66)	0.37 (0.57)	0.101	79	74	0.83 (0.92)	0.52 (0.57)	<0.001
Family rules are clear	No	14	15	0.25 (0.59)	0.54 (0.48)	0.081	19	26	0.52 (0.92)	0.43 (0.68)	0.389
	Yes	86	85	0.22 (0.63)	0.33 (0.57)	0.138	81	74	0.86 (0.94)	0.52 (0.56)	<0.001
Parents control everything	No	61	59	0.24 (0.61)	0.44 (0.56)	0.017	60	62	0.88 (0.95)	0.52 (0.58)	<0.001
	Yes	39	40	0.20 (0.66)	0.24 (0.54)	0.738	38	33	0.68 (0.91)	0.49 (0.62)	0.029
Parents ask my thoughts before family decisions affecting me are made	No	25	28	0.17 (0.62)	0.56 (0.65)	0.004	24	32	0.59 (0.92)	0.41 (0.62)	0.048
	Yes	73	71	0.24 (0.63)	0.28 (0.51)	0.595	73	64	0.85 (0.93)	0.55 (0.58)	<0.001
Parents overprotect	No	76	68	0.25 (0.61)	0.42 (0.52)	0.030	73	71	0.87 (0.93)	0.53 (0.59)	<0.001
	Yes	22	31	0.14 (0.66)	0.22 (0.62)	0.531	26	25	0.65 (0.94)	0.43 (0.61)	0.034
<b>NEIGHBOURHOOD</b>											
Number of homes lived in since birth	1-3	56	49	0.20 (0.61)	0.39 (0.62)	0.051	61	39	0.81 (0.89)	0.51 (0.63)	<0.001
	≥4	42	49	0.25 (0.64)	0.33 (0.50)	0.398	37	59	0.78 (1.03)	0.49 (0.58)	<0.001

APPENDIX E  
Results relating to application of the "Adolescent Attitudes to Contraception Scale"

Table E.1 continued...

		MALES					FEMALES				
<b>Total n=1404</b>		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=331	SA <sup>Δ</sup> n=112	p	% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=508	SA <sup>Δ</sup> n=453	p
				<b>Mean (SD)</b>	<b>Mean (SD)</b>				<b>Mean (SD)</b>	<b>Mean (SD)</b>	
Years at current address	≤1 year	8	9	0.30 (0.60)	0.26 (0.82)	0.899	13	31	0.83 (1.04)	0.45 (0.58)	0.001
	>1 year	89	88	0.22 (0.63)	0.36 (0.52)	0.036	86	67	0.80 (0.93)	0.52 (0.60)	<0.001
	<1 year	8	7	0.29 (0.60)	0.24 (0.92)	0.845	11	28	0.82 (1.03)	0.45 (0.60)	0.003
	1-5 years	41	37	0.29 (0.67)	0.37 (0.52)	0.497	33	36	0.75 (0.97)	0.52 (0.59)	0.009
	>5 years	50	54	0.16 (0.59)	0.36 (0.52)	0.019	55	35	0.82 (0.90)	0.51 (0.60)	<0.001
Safe neighbourhood	Disagree/unsure	13	20	0.14 (0.74)	0.32 (0.52)	0.291	14	24	0.61 (0.94)	0.46 (0.61)	0.199
	Agree	87	80	0.23 (0.61)	0.37 (0.57)	0.066	86	75	0.83 (0.94)	0.51 (0.59)	<0.001
Clean neighbourhood	Disagree/unsure	17	19	0.22 (0.77)	0.31 (0.69)	0.649	15	21	0.81 (0.85)	0.47 (0.62)	0.003
	Agree	83	79	0.22 (0.60)	0.37 (0.53)	0.038	84	78	0.80 (0.95)	0.51 (0.59)	<0.001
Theft/vandalism in neighbourhood	No/unsure	30	30	0.30 (0.66)	0.24 (0.48)	0.630	29	22	0.76 (0.92)	0.47 (0.61)	0.006
	Yes	70	70	0.19 (0.61)	0.41 (0.58)	0.005	70	77	0.82 (0.95)	0.51 (0.59)	<0.001
Violence (any) in neighbourhood	No/unsure	71	65	0.23 (0.65)	0.35 (0.54)	0.143	76	47	0.86 (0.95)	0.53 (0.60)	<0.001
	Yes	28	35	0.22 (0.56)	0.37 (0.59)	0.171	24	52	0.64 (0.88)	0.47 (0.59)	0.033
Domestic violence in neighbourhood	No/unsure	81	76	0.23 (0.62)	0.35 (0.57)	0.115	85	61	0.85 (0.95)	0.53 (0.58)	<0.001
	Yes	18	24	0.23 (0.62)	0.40 (0.54)	0.234	14	38	0.54 (0.86)	0.46 (0.63)	0.382
Participated in sport/recreation activities during last 12 months	No	18	12	0.11 (0.50)	0.39 (0.43)	0.065	21	45	0.73 (1.05)	0.47 (0.63)	0.008
	Yes	82	88	0.24 (0.65)	0.36 (0.57)	0.120	78	54	0.82 (0.91)	0.53 (0.56)	<0.001
Participated in youth group activities during last 12 months	No	68	63	0.20 (0.61)	0.45 (0.54)	0.003	67	78	0.81 (0.92)	0.51 (0.59)	<0.001
	Yes	31	38	0.25 (0.67)	0.21 (0.55)	0.759	31	22	0.79 (0.99)	0.46 (0.61)	0.003
<b>SCHOOL</b>											
Ever repeated a year at school	No	94	88	0.22 (0.61)	0.39 (0.55)	0.013	96	91	0.81 (0.95)	0.50 (0.60)	<0.001
	Yes	6	12	0.30 (0.88)	0.13 (0.59)	0.541	3	8	0.59 (0.74)	0.50 (0.56)	0.589

APPENDIX E  
Results relating to application of the “Adolescent Attitudes to Contraception Scale”

Table E.1 continued...

		MALES					FEMALES				
		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=331	SA <sup>Δ</sup> n=112	p	% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=508	SA <sup>Δ</sup> n=453	p
Total n=1404											
Ever skipped school	No	76	69	Mean (SD) 0.26 (0.64)	Mean (SD) 0.36 (0.55)	0.241			Mean (SD) 0.81 (0.93)	Mean (SD) 0.59 (0.60)	0.009
	Yes	22	30	0.11 (0.58)	0.38 (0.58)	0.025			0.73 (1.01)	0.40 (0.59)	0.004
PSYCHOLOGICAL SCALES											
Low personal self-efficacy <sup>*</sup>	Normal	46	49	0.26 (0.66)	0.43 (0.62)	0.111			0.85 (0.96)	0.63 (0.57)	0.005
	Borderline/Low self-efficacy	37	35	0.16 (0.50)	0.29 (0.53)	0.193			0.72 (0.91)	0.39 (0.54)	<0.001
Low self-esteem <sup>†</sup>	No	84	87	0.22 (0.60)	0.34 (0.56)	0.082			0.85 (0.95)	0.56 (0.57)	<0.001
	Yes	10	8	0.26 (0.91)	0.37 (0.52)	0.717			0.57 (0.79)	0.34 (0.60)	0.035
SDQ Emotional difficulties <sup>‡</sup>	Normal	92	93	0.22 (0.60)	0.36 (0.57)	0.034			0.83 (0.95)	0.56 (0.57)	<0.001
	Borderline/abnormal	6	6	0.24 (0.99)	0.26 (0.35)	0.951			0.69 (0.89)	0.33 (0.60)	0.001
SDQ Conduct problems <sup>‡</sup>	Normal	76	57	0.22 (0.63)	0.39 (0.63)	0.056			0.83 (0.92)	0.58 (0.56)	<0.001
	Borderline/abnormal	23	42	0.22 (0.63)	0.31 (0.45)	0.388			0.64 (1.01)	0.33 (0.61)	0.005
SDQ Hyperactivity <sup>‡</sup>	Normal	71	64	0.20 (0.63)	0.35 (0.58)	0.085			0.89 (0.96)	0.57 (0.55)	<0.001
	Borderline/abnormal	27	35	0.28 (0.63)	0.38 (0.52)	0.368			0.59 (0.85)	0.40 (0.62)	0.022
SDQ Peer problems <sup>‡</sup>	Normal	79	78	0.22 (0.57)	0.41 (0.55)	0.006			0.84 (0.93)	0.54 (0.57)	<0.001
	Borderline/abnormal	19	21	0.25 (0.83)	0.17 (0.57)	0.673			0.59 (1.00)	0.39 (0.61)	0.101
SDQ Prosocial scale <sup>‡</sup>	Normal	64	69	0.26 (0.67)	0.38 (0.62)	0.152			0.82 (0.96)	0.52 (0.57)	<0.001
	Borderline/abnormal	34	30	0.16 (0.55)	0.30 (0.38)	0.154			0.69 (0.78)	0.38 (0.63)	0.015
SDQ Total difficulties <sup>‡</sup>	Normal	79	70	0.23 (0.60)	0.40 (0.58)	0.027			0.86 (0.95)	0.61 (0.55)	<0.001
	Borderline/abnormal	19	29	0.19 (0.74)	0.25 (0.50)	0.639			0.58 (0.87)	0.31 (0.59)	0.013

\* Score derived from Cowen’s Personal Self-Efficacy Scale (Cowen, et al., 1991).

† Score derived from Rosenberg’s Self-Esteem Scale (Rosenberg, 1989).

‡ Score and sub-scales derived from Strengths and Difficulties Questionnaire (Goodman, 1999).

APPENDIX E  
Results relating to application of the "Adolescent Attitudes to Contraception Scale"

Table E.1 continued...

		MALES					FEMALES				
		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=331	SA <sup>Δ</sup> n=112	p	% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=508	SA <sup>Δ</sup> n=453	p
Total n=1404											
				Mean (SD)	Mean (SD)				Mean (SD)	Mean (SD)	
<b>FRIENDSHIPS</b>											
Experienced negative treatment by others	No	3	2	0.26 (0.65)	0.06 (0.42)	0.694	3	1	1.00 (0.94)	1.24 (0.20)	0.667
	Yes	96	98	0.21 (0.61)	0.36 (0.56)	0.024	96	99	0.80 (0.94)	0.50 (0.58)	<0.001
Any close friends	No	4	3	0.28 (0.83)	0.33 (0.12)	0.912	3	2	1.07 (1.22)	0.69 (0.68)	0.429
	Yes	95	97	0.22 (0.62)	0.36 (0.56)	0.040	97	97	0.79 (0.94)	0.50 (0.60)	<0.001
Importance of friendships	Less	19	12	0.12 (0.59)	0.23 (0.30)	0.511	5	17	0.57 (0.89)	0.37 (0.55)	0.174
	More	79	88	0.25 (0.64)	0.38 (0.58)	0.089	94	82	0.81 (0.95)	0.53 (0.61)	<0.001
Friends mainly from school	No	15	23	0.22 (0.61)	0.47 (0.51)	0.086	15	37	0.60 (0.91)	0.40 (0.57)	0.036
	Yes	85	77	0.22 (0.63)	0.33 (0.57)	0.176	85	62	0.83 (0.94)	0.56 (0.60)	<0.001
Friends of both sexes	No	37	23	0.13 (0.60)	0.19 (0.49)	0.671	39	25	0.85 (1.01)	0.42 (0.61)	<0.001
	Yes	63	77	0.28 (0.64)	0.41 (0.57)	0.090	61	75	0.76 (0.89)	0.52 (0.59)	<0.001
Friends mainly of same sex	No	63	78	0.26 (0.65)	0.39 (0.56)	0.107	53	78	0.69 (0.88)	0.50 (0.60)	0.002
	Yes	37	22	0.16 (0.59)	0.26 (0.53)	0.430	47	22	0.92 (0.99)	0.49 (0.59)	<0.001
Friends mainly of opposite sex	No	90	81	0.19 (0.63)	0.40 (0.53)	0.004	92	79	0.79 (0.94)	0.55 (0.57)	<0.001
	Yes	10	19	0.50 (0.55)	0.17 (0.64)	0.046	8	21	0.89 (1.00)	0.30 (0.65)	<0.001
Friends mainly of same age	No	22	32	0.30 (0.79)	0.26 (0.67)	0.770	22	46	0.58 (0.93)	0.43 (0.60)	0.091
	Yes	78	68	0.20 (0.57)	0.41 (0.49)	0.005	78	54	0.86 (0.94)	0.55 (0.59)	<0.001
Friends mainly older	No	85	75	0.23 (0.63)	0.43 (0.52)	0.008	82	55	0.79 (0.94)	0.54 (0.55)	<0.001
	Yes	15	25	0.19 (0.63)	0.15 (0.61)	0.754	18	44	0.85 (0.94)	0.45 (0.65)	<0.001
Friends mainly younger	No	89	88	0.24 (0.64)	0.40 (0.53)	0.027	94	93	0.80 (0.95)	0.50 (0.60)	<0.001
	Yes	11	13	0.09 (0.54)	0.10 (0.71)	0.971	6	6	0.75 (0.83)	0.43 (0.54)	0.091

APPENDIX E  
Results relating to application of the "Adolescent Attitudes to Contraception Scale"

Table E.1 continued...

		MALES					FEMALES				
Total n=1404		% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=331	SA <sup>Δ</sup> n=112	p	% <sub>notSA</sub> <sup>Δ</sup>	% <sub>SA</sub> <sup>Δ</sup>	Not SA <sup>Δ</sup> n=508	SA <sup>Δ</sup> n=453	p
				Mean (SD)	Mean (SD)				Mean (SD)	Mean (SD)	
ROMANTIC RELATIONSHIPS											
Relationship status	Single/casual	95	80	0.22 (0.63)	0.36 (0.59)	0.066	96	49	0.80 (0.95)	0.53 (0.60)	<0.001
	Committed relationship/engaged	4	16	0.24 (0.51)	0.38 (0.44)	0.439	4	51	0.79 (0.87)	0.47 (0.59)	0.033
Current relationship status/duration						0.062					0.004
	Casual partners/single	83	59	0.23 (0.63)	0.33 (0.59)		84	84	0.84 (0.95)	0.58 (0.60)	
	Time with partner < 1 year	12	29	0.17 (0.57)	0.42 (0.57)	0.957	13	44	0.55 (0.85)	0.45 (0.61)	0.309
	Time with partner ≥1 year	2	8	0.39 (0.92)	0.37 (0.37)	0.242	2	28	0.56 (0.80)	0.48 (0.56)	0.705
Age of partner (note missing cases)	≤13	3	4	-0.10 (0.66)	0.17 (0.21)	0.437	1	1	0.08 (0.75)	0.78 (0.52)	0.099
	14-15	11	27	0.29 (0.63)	0.46 (0.60)	0.262	9	9	0.67 (0.90)	0.61 (0.56)	0.678
	≥16	1	6	0.03 (0.01)	0.28 (0.21)	0.149	6	61	0.44 (0.71)	0.45 (0.60)	0.945
SEXUAL BEHAVIOUR											
Sexual attraction	Heterosexual	97	95	0.22 (0.63)	0.36 (0.57)	0.037	90	86	0.79 (0.91)	0.52 (0.58)	<0.001
	Bi- or homosexual	1	4	0.03 (0.30)	0.43 (0.32)	0.192	3	10	0.87 (1.33)	0.30 (0.69)	0.032
	Not sure						5	3	0.78 (1.22)	0.45 (0.58)	0.359
Age of onset of kissing	≤13	33	71	0.21 (0.59)	0.35 (0.61)	0.128	26	58	0.64 (0.83)	0.47 (0.59)	0.022
	14-15	14	21	0.34 (0.73)	0.36 (0.44)	0.918	17	34	0.80 (0.90)	0.56 (0.59)	0.015
	≥16	1	1	0.44 (0.60)	0.57 (n=1)	0.889	2	6	0.89 (1.05)	0.39 (0.68)	0.112
Age of onset of genital touching	≤13	11	47	0.33 (0.53)	0.40 (0.62)	0.586	6	27	0.40 (0.88)	0.44 (0.58)	0.724
	14-15	8	36	0.42 (0.82)	0.38 (0.49)	0.814	11	56	0.78 (0.88)	0.51 (0.60)	0.007
	≥16	1	2	0.10 (0.12)	0.34 (0.32)	0.429	1	12	1.02 (1.34)	0.52 (0.68)	0.154
PREGNANCY											
Would like to become a parent soon	Yes	5	12	0.10 (0.41)	0.05 (0.59)	0.786	7	15	0.31 (0.81)	0.27 (0.60)	0.775
	No	82	77	0.22 (0.64)	0.42 (0.57)	0.011	85	64	0.84 (0.94)	0.54 (0.57)	<0.001

**Table E.2**

**Rasch Mean AAC Scale Locations (Comparisons by Duration of Sexual Activity for Females)**

<sup>Δ</sup>SA = sexually active (vaginal intercourse), data relating to the age at sexual debut was missing for 82 females

Note: % do not sum to 100% if missing data

					FEMALES		p
		% <sub>SA</sub> <sup>Δ</sup> <1yr	% <sub>SA</sub> <sup>Δ</sup> ≥1yr	r	SA <sup>Δ</sup> <1yr n=94	SA <sup>Δ</sup> ≥1yr n=284	
<b>Total n=378</b>							
					<b>Mean (SD)</b>	<b>Mean (SD)</b>	
All					0.60 (0.59)	0.45 (0.62)	0.040
<b>GENERAL</b>							
Age	≤14	26	4	0.51 (0.61)	0.74 (0.39)		0.271
	≥15	72	95	0.63 (0.58)	0.43 (0.62)		0.021
ATSI	No	94	92	0.59 (0.60)	0.44 (0.63)		0.062
	Yes	4	7	0.81 (0.20)	0.47 (0.49)		0.184
English spoken at home	No	1	<1	-0.64 (n=1)	-0.036 (n=1)		-
	Yes	97	99	0.60 (0.59)	0.45 (0.62)		0.044
Religious affiliation	None	45	59	0.60 (0.51)	0.43 (0.66)		0.118
	Christianity	51	37	0.59 (0.62)	0.49 (0.56)		0.358
	Other	2	3	0.85 (1.57)	0.25 (0.43)		0.172
<b>FAMILY BACKGROUND</b>							
Mother working	No	22	30	0.75 (0.81)	0.40 (0.57)		0.023
	Yes	71	59	0.55 (0.51)	0.45 (0.63)		0.247
Father working	No	4	11	0.55 (0.42)	0.47 (0.75)		0.844
	Yes	80	68	0.61 (0.62)	0.46 (0.60)		0.080
Mother's highest education level	Unsure	17	15	0.53 (0.60)	0.49 (0.66)		0.833
	Some school	21	29	0.66 (0.57)	0.36 (0.58)		0.040
	TAFE/trade/completed high school	40	38	0.63 (0.48)	0.44 (0.63)		0.099
	University	17	13	0.53 (0.85)	0.54 (0.58)		0.987
Father's highest education level	Unsure	16	20	0.42 (0.61)	0.58 (0.60)		0.382
	Some school	21	22	0.58 (0.82)	0.33 (0.56)		0.136
	TAFE/trade/completed high school	34	31	0.63 (0.49)	0.46 (0.65)		0.172
	University	18	14	0.68 (0.51)	0.48 (0.61)		0.260
<b>ALCOHOL AND/OR OTHER DRUG USE</b>							
Mother smoked ever	No	61	51	0.55 (0.63)	0.48 (0.57)		0.444
	Yes	36	44	0.68 (0.51)	0.39 (0.66)		0.017
Father smoked ever	No	53	44	0.62 (0.63)	0.52 (0.64)		0.344
	Yes	35	42	0.54 (0.58)	0.39 (0.58)		0.203
Mother drinks alcohol	No/occasional	83	74	0.61 (0.60)	0.45 (0.61)		0.046
	Yes	14	20	0.52 (0.56)	0.42 (0.62)		0.257
Father drinks alcohol	No/occasional	64	53	0.60 (0.60)	0.49 (0.64)		0.237
	Yes	26	35	0.56 (0.63)	0.39 (0.57)		0.202
Ever smoked	No	39	16	0.63 (0.62)	0.52 (0.47)		0.347
	Yes	59	83	0.57 (0.57)	0.43 (0.64)		0.129
Ever drunk alcohol	No	3	2	1.13 (0.72)	0.48 (0.43)		0.154
	Yes	94	96	0.58 (0.58)	0.44 (0.62)		0.069

Table E.2 continued...

				FEMALES		
		% <sub>SA</sub> <sup>Δ</sup> <1yr	% <sub>SA</sub> <sup>Δ</sup> ≥1yr	SA <sup>Δ</sup> <1yr	SA <sup>Δ</sup> ≥1yr	p
Total n=378		r		n=94	n=284	
				Mean (SD)	Mean (SD)	
Ever used illicit drugs	No	71	51	0.63 (0.61)	0.54 (0.61)	0.284
	Yes	27	48	0.50 (0.54)	0.35 (0.61)	0.253
Alcohol/drug problems in family	No	70	55	0.55 (0.60)	0.53 (0.63)	0.852
	Yes	27	44	0.72 (0.58)	0.34 (0.58)	0.004
Alcohol/drug problems with close friend or boy/girlfriend	No	57	45	0.63 (0.53)	0.58 (0.58)	0.596
	Yes	40	53	0.55 (0.67)	0.33 (0.62)	0.055
Parents would find out if drank alcohol	No	50	56	0.59 (0.52)	0.40 (0.65)	0.064
	Yes	40	31	0.68 (0.55)	0.50 (0.58)	0.113
FAMILY FUNCTIONING						
Lives with both parents	No	51	68	0.56 (0.63)	0.46 (0.59)	0.324
	Yes	47	31	0.64 (0.55)	0.40 (0.67)	0.048
Family supportive	No	5	5	0.12 (1.27)	0.24 (0.44)	0.758
	Yes	84	85	0.64 (0.52)	0.46 (0.62)	0.018
Ask parents for help with personal problems	No	28	20	0.48 (0.80)	0.32 (0.65)	0.341
	Yes	69	75	0.64 (0.48)	0.47 (0.60)	0.037
Family rules are clear	No	19	31	0.45 (0.84)	0.41 (0.67)	0.808
	Yes	79	68	0.63 (0.51)	0.46 (0.59)	0.031
Parents control everything	No	49	66	0.67 (0.50)	0.47 (0.61)	0.039
	Yes	47	26	0.54 (0.67)	0.40 (0.62)	0.266
Parents ask my thoughts before family decisions affecting me are made	No	37	32	0.49 (0.68)	0.31 (0.59)	0.135
	Yes	60	63	0.68 (0.51)	0.52 (0.62)	0.093
Parents overprotect	No	62	74	0.70 (0.54)	0.47 (0.62)	0.011
	Yes	30	21	0.45 (0.67)	0.34 (0.61)	0.457
NEIGHBOURHOOD						
Number of homes lived in since birth	1-3	45	33	0.44 (0.70)	0.50 (0.66)	0.604
	≥4	51	64	0.75 (0.44)	0.42 (0.60)	<0.001
Years at current address	≤1 year	23	37	0.60 (0.46)	0.38 (0.60)	0.104
	>1 year	72	60	0.59 (0.64)	0.50 (0.62)	0.309
	<1 year	21	33	0.58 (0.47)	0.37 (0.63)	0.160
	1-5 years	37	33	0.66 (0.62)	0.47 (0.57)	0.115
	>5 years	37	31	0.53 (0.64)	0.49 (0.66)	0.767
Safe neighbourhood	Disagree/unsure	26	26	0.54 (0.57)	0.40 (0.63)	0.338
	Agree	72	72	0.62 (0.60)	0.46 (0.61)	0.069
Clean neighbourhood	Disagree/unsure	17	24	0.55 (0.63)	0.41 (0.63)	0.431
	Agree	80	75	0.61 (0.58)	0.46 (0.62)	0.058
Theft/vandalism in neighbourhood	No/unsure	22	20	0.68 (0.42)	0.43 (0.68)	0.120
	Yes	76	79	0.57 (0.63)	0.45 (0.60)	0.148



Table E.2 continued...

				FEMALES		p
		% <sub>SA</sub> <sup>Δ</sup> <1yr	% <sub>SA</sub> <sup>Δ</sup> ≥1yr	SA <sup>Δ</sup> <1yr	SA <sup>Δ</sup> ≥1yr	
Total n=378		r		n=94	n=284	
				Mean (SD)	Mean (SD)	
Violence (any) in neighbourhood	No/unsure	48	45	0.62 (0.60)	0.50 (0.63)	0.247
	Yes	50	53	0.57 (0.59)	0.40 (0.61)	0.101
Domestic violence in neighbourhood	No/unsure	65	58	0.60 (0.56)	0.49 (0.61)	0.199
	Yes	33	40	0.59 (0.66)	0.39 (0.63)	0.133
Participated in sport/recreation activities during last 12 months	No	38	54	0.64 (0.75)	0.41 (0.60)	0.053
	Yes	60	44	0.57 (0.46)	0.49 (0.63)	0.424
Participated in youth group activities during last 12 months	No	69	83	0.64 (0.61)	0.47 (0.60)	0.045
	Yes	28	16	0.49 (0.54)	0.35 (0.70)	0.386
<b>SCHOOL</b>						
Ever repeated a year at school	No	93	87	0.59 (0.60)	0.45 (0.62)	0.081
	Yes	4	11	0.87 (0.16)	0.44 (0.59)	0.168
Ever skipped school	No	41	18	0.63 (0.64)	0.58 (0.63)	0.697
	Yes	35	23	0.48 (0.55)	0.29 (0.64)	0.142
<b>PSYCHOLOGICAL SCALES</b>						
Low personal self-efficacy <sup>*</sup>	Normal	38	37	0.68 (0.52)	0.60 (0.60)	0.478
	Borderline/Abnormal	41	41	0.60 (0.55)	0.30 (0.54)	0.004
Low self-esteem <sup>†</sup>	No	68	70	0.64 (0.53)	0.54 (0.61)	0.233
	Yes	23	20	0.57 (0.49)	0.22 (0.61)	0.021
SDQ Emotional difficulties <sup>‡</sup>	Normal	74	69	0.64 (0.50)	0.52 (0.61)	0.131
	Borderline/abnormal	22	30	0.57 (0.57)	0.27 (0.60)	0.039
SDQ Conduct problems <sup>‡</sup>	Normal	67	68	0.70 (0.46)	0.53 (0.61)	0.044
	Borderline/abnormal	30	31	0.45 (0.60)	0.25 (0.60)	0.123
SDQ Hyperactivity <sup>‡</sup>	Normal	62	60	0.68 (0.47)	0.52 (0.59)	0.079
	Borderline/abnormal	35	39	0.54 (0.59)	0.32 (0.64)	0.083
SDQ Peer problems <sup>‡</sup>	Normal	78	73	0.63 (0.49)	0.50 (0.62)	0.111
	Borderline/abnormal	19	26	0.61 (0.62)	0.29 (0.59)	0.042
SDQ Prosocial scale <sup>‡</sup>	Normal	85	83	0.65 (0.49)	0.47 (0.62)	0.015
	Borderline/abnormal	12	15	0.43 (0.70)	0.32 (0.60)	0.609
SDQ Total difficulties <sup>‡</sup>	Normal	65	58	0.69 (0.46)	0.59 (0.61)	0.236
	Borderline/abnormal	32	41	0.50 (0.60)	0.24 (0.57)	0.032
<b>FRIENDSHIPS</b>						
Experienced negative treatment by others	No	<1	1	1.20 (n=1)	1.26 (0.28)	0.888
	Yes	96	99	0.62 (0.52)	0.44 (0.61)	0.012
Any close friends	No	<1	2	0.07 (n=1)	0.90 (0.66)	0.311
	Yes	97	96	0.60 (0.59)	0.44 (0.62)	0.026
Importance of friendships	Less	7	24	0.07 (1.06)	0.38 (0.46)	0.151

<sup>\*</sup> Score derived from Cowen's Personal Self-Efficacy Scale (Cowen, et al., 1991)

<sup>†</sup> Score derived from Rosenberg's Self-Esteem Scale (Rosenberg, 1989).

<sup>‡</sup> Score and sub-scales derived from Strengths and Difficulties Questionnaire (Goodman, 1999).

Table E.2 continued...

		FEMALES				
		% <sub>SA</sub> <sup>Δ</sup> <1yr	% <sub>SA</sub> <sup>Δ</sup> ≥1yr	SA <sup>Δ</sup> <1yr	SA <sup>Δ</sup> ≥1yr	p
		r				
Total n=378				n=94	n=284	
				Mean (SD)	Mean (SD)	
	More	89	74	0.65 (0.52)	0.47 (0.66)	0.029
Friends mainly from school	No	21	44	0.58 (0.54)	0.34 (0.59)	0.105
	Yes	77	55	0.60 (0.61)	0.53 (0.63)	0.390
Friends of both sexes	No	24	24	0.55 (0.72)	0.33 (0.59)	0.153
	Yes	73	75	0.61 (0.54)	0.48 (0.62)	0.120
Friends mainly of same sex	No	73	80	0.56 (0.62)	0.46 (0.61)	0.217
	Yes	24	18	0.70 (0.49)	0.40 (0.64)	0.046
Friends mainly of opposite sex	No	79	74	0.66 (0.50)	0.51 (0.61)	0.056
	Yes	19	24	0.34 (0.83)	0.26 (0.60)	0.627
Friends mainly of same age	No	43	48	0.58 (0.68)	0.39 (0.61)	0.078
	Yes	55	50	0.61 (0.51)	0.50 (0.63)	0.293
Friends mainly older	No	55	49	0.68 (0.45)	0.47 (0.59)	0.020
	Yes	43	49	0.48 (0.72)	0.42 (0.65)	0.588
Friends mainly younger	No	91	92	0.61 (0.58)	0.45 (0.63)	0.041
	Yes	6	6	0.43 (0.79)	0.36 (0.47)	0.795
<b>ROMANTIC RELATIONSHIPS</b>						
Relationship status	Single/casual	46	41	0.65 (0.56)	0.50 (0.65)	0.172
	Committed relationship/engaged	52	58	0.55 (0.62)	0.41 (0.59)	0.150
Current relationship status/duration	Casual partners/single	21	25	0.62 (0.62)	0.63 (0.64)	0.949
	Time with partner < 1 year	54	39	0.55 (0.61)	0.34 (0.62)	0.047
	Time with partner ≥1 years	22	35	0.69 (0.50)	0.42 (0.56)	0.043
Age of partner (note missing cases)	≤15	17	3	0.70 (0.53)	0.33 (0.62)	0.139
	≥16	57	70	0.58 (0.60)	0.39 (0.60)	0.036
<b>SEXUAL BEHAVIOUR</b>						
Sexual attraction	Heterosexual	87	83	0.58 (0.59)	0.47 (0.60)	0.153
	Bi- or homosexual	7	12	0.83 (0.63)	0.18 (0.69)	0.026
	Not sure	2	3	0.25 (0.56)	0.66 (0.61)	0.416
Age of onset of kissing	≤13	54	55	0.60 (0.51)	0.39 (0.63)	0.030
	14-15	32	37	0.63 (0.51)	0.53 (0.63)	0.402
	≥16	12	6	0.46 (1.04)	0.35 (0.34)	0.699
	≤15	86	92	0.62 (0.51)	0.45 (0.63)	0.029
Age of onset of genital touching	≥16	12	6	0.46 (1.04)	0.35 (0.34)	0.699
	≤13	21	28	0.63 (0.62)	0.39 (0.56)	0.098
	14-15	51	58	0.61 (0.50)	0.46 (0.65)	0.159
	≥16	20	12	0.48 (0.80)	0.51 (0.60)	0.875
	≤15	72	86	0.62 (0.53)	0.44 (0.62)	0.036
	≥16	20	12	0.48 (0.80)	0.51 (0.60)	0.875

Table E.2 continued...

				FEMALES		p
		% <sub>SA</sub> <sup>Δ</sup> <1yr	% <sub>SA</sub> <sup>Δ</sup> ≥1yr	SA <sup>Δ</sup> <1yr	SA <sup>Δ</sup> ≥1yr	
Total n=378		r		n=94	n=284	
				Mean (SD)	Mean (SD)	
Age of onset of sexual activity- oral sex	≤13	6	10	0.87 (0.48)	0.44 (0.64)	0.129
	14-15	43	51	0.52 (0.56)	0.45 (0.66)	0.542
	≥16	34	26	0.59 (0.67)	0.43 (0.54)	0.194
	≤15	49	62	0.56 (0.56)	0.45 (0.66)	0.268
	≥16	34	26	0.59 (0.67)	0.43 (0.54)	0.194
Age of onset of sexual activity - vaginal sex	≤13	6	17	1.00 (0.31)	0.43 (0.53)	0.013
	14-15	47	63	0.52 (0.55)	0.45 (0.65)	0.533
	≥16	45	20	0.62 (0.64)	0.45 (0.59)	0.167
	≤15	53	80	0.57 (0.55)	0.44 (0.62)	0.176
	≥16	45	20	0.62 (0.64)	0.45 (0.59)	0.167
Age of onset of sexual activity - anal sex	≤13	2	1	1.27 (0.47)	0.81 (0.60)	0.427
	14-15	3	11	0.40 (0.40)	0.31 (0.62)	0.826
	≥16	6	16	0.45 (0.56)	0.33 (0.61)	0.651
	≤15	5	12	0.75 (0.61)	0.36 (0.62)	0.198
	≥16	6	16	0.45 (0.56)	0.33 (0.61)	0.651
Age at sexual debut (oral/vaginal/anal sex)	≤13	10	20	0.71 (0.58)	0.39 (0.57)	0.122
	14-15	52	64	0.58 (0.53)	0.45 (0.64)	0.202
	≥16	36	15	0.59 (0.68)	0.50 (0.56)	0.505
	≤15	62	84	0.60 (0.53)	0.44 (0.63)	0.070
	≥16	36	15	0.59 (0.68)	0.50 (0.56)	0.505
Number of oral sex partners in previous year	1	62	48	0.57 (0.63)	0.51 (0.59)	0.506
	2	13	18	0.48 (0.35)	0.48 (0.59)	0.987
	≥3	10	24	0.70 (0.53)	0.22 (0.65)	0.034
Number of people had oral sex but not intercourse with in last year	1	57	54	0.52 (0.60)	0.47 (0.60)	0.590
	2	12	14	0.56 (0.56)	0.37 (0.62)	0.375
	≥3	5	11	0.65 (0.55)	0.28 (0.75)	0.306
Number of people had vaginal intercourse with in last year	1	67	47	0.58 (0.62)	0.48 (0.59)	0.278
	2	11	18	0.50 (0.61)	0.55 (0.54)	0.766
	≥3	12	28	0.87 (0.47)	0.26 (0.65)	0.004
Number of people had any form of sexual intercourse with in last year	1	64	45	0.59 (0.61)	0.49 (0.59)	0.312
	2	20	18	0.49 (0.54)	0.60 (0.54)	0.465
	≥3	13	35	0.77 (0.55)	0.28 (0.64)	0.012
Ever had unwanted sex	No	67	52	0.65 (0.52)	0.55 (0.61)	0.294
	Yes	24	42	0.49 (0.77)	0.29 (0.60)	0.177
Reasons for unwanted sex	Drunk or high	13	22	0.70 (0.49)	0.30 (0.64)	0.042
	Person I had sex with thought I should	11	17	0.53 (1.07)	0.20 (0.58)	0.169
Drunk or high last time had sex	No	79	80	0.60 (0.61)	0.47 (0.62)	0.137

Table E.2 continued...

				FEMALES		
		% <sub>SA</sub> <sup>Δ</sup> <1yr	% <sub>SA</sub> <sup>Δ</sup> ≥1yr	SA <sup>Δ</sup> <1yr	SA <sup>Δ</sup> ≥1yr	p
Total n=378		r		n=94	n=284	
				Mean (SD)	Mean (SD)	
	Yes	13	14	0.65 (0.58)	0.25 (0.59)	0.047
Discussed avoiding pregnancy before last sexual encounter	No	50	66	0.60 (0.51)	0.38 (0.64)	0.028
	Yes	40	26	0.60 (0.71)	0.59 (0.56)	0.920
Condom use in previous 12 months	Always	39	17	0.78 (0.49)	0.64 (0.50)	0.214
	Sometimes	38	61	0.55 (0.54)	0.44 (0.61)	0.310
	Never	11	16	0.32 (0.94)	0.23 (0.72)	0.727
Ever used condoms	No	23	26	0.33 (0.69)	0.21 (0.67)	0.460
	Yes	74	74	0.68 (0.53)	0.53 (0.57)	0.052
Ever used oral contraceptives	No	74	58	0.61 (0.63)	0.42 (0.65)	0.041
	Yes	23	41	0.57 (0.46)	0.48 (0.56)	0.524
Ever used withdrawal/rhythm method	No	83	60	0.59 (0.59)	0.46 (0.63)	0.115
	Yes	15	39	0.61 (0.60)	0.42 (0.60)	0.278
Ever used oral/anal sex to prevent pregnancy	No	90	79	0.59 (0.60)	0.45 (0.62)	0.093
	Yes	7	21	0.72 (0.47)	0.41 (0.61)	0.198
Ever used morning after pill	No	87	80	0.62 (0.60)	0.44 (0.64)	0.028
	Yes	11	19	0.39 (0.47)	0.45 (0.52)	0.728
Ever used Depo Provera/IUD/Implanon	No	95	91	0.62 (0.58)	0.46 (0.62)	0.032
	Yes	3	8	-0.06 (0.46)	0.32 (0.57)	0.283
Never used contraception	No	85	89	0.64 (0.52)	0.50 (0.58)	0.048
	Yes	13	11	0.30 (0.91)	0.02 (0.74)	0.295
PREGNANCY						
Would like to become a parent soon	Yes	12	18	0.23 (0.89)	0.23 (0.54)	0.988
	No	71	56	0.64 (0.51)	0.48 (0.60)	0.073

**Table E.3**  
**AAC Scale Adjusted Univariate Linear Regression Models (Comparisons by Sexual Activity Status)**

		B	SE(B)	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<b>BASE model:</b>				<b>0.089</b>		<b>&lt;0.001</b>
Age		0.040	0.020			
ATSI		0.044	0.095			
+Female – sexually active <1year		-0.239	0.086			
+Female – sexually active ≥1year		-0.443	0.071			
+Male – sexually active		-0.449	0.078			
+Male – not sexually active		-0.570	0.053			
+Female – sexually active (duration data missing)		-0.238	0.090			
<b>Plus (added individually):</b>						
<i>General</i>						
English spoken at home		0.032	0.236	0.092	-	0.894
Religious affiliation = Christianity		0.044	0.041	0.093	0.001	0.280
<i>Family background</i>						
Mother working		-0.128	0.050	0.103	0.005	0.010
Father working		-0.038	0.089	0.104	-	0.668
Mother's highest education level	<i>Some school</i>	0.083	0.064	0.090	-	0.332
	<i>Finish school/TAFE</i>	0.040	0.054	0.090	-	0.756
	<i>University</i>	0.049	0.058	0.090	-	0.391
Father's highest education level	<i>Some school</i>	0.044	0.067	0.105	0.001	0.307
	<i>Finish school/TAFE</i>	-0.027	0.055	0.106	-	0.625
	<i>University</i>	0.004	0.051	0.106	-	0.936
<i>Alcohol and/or other drug use</i>						
Mother smoked ever		0.016	0.050	0.095	-	0.752
Father smoked ever		-0.088	0.048	0.096	0.002	0.066
Mother drinks alcohol		-0.003	0.053	0.090	-	0.957
Father drinks alcohol		-0.019	0.045	0.093	-	0.675
Ever smoked		-0.156	0.049	0.095	0.006	0.002
Ever drunk alcohol		-0.059	0.069	0.088	0.001	0.396
Ever used illicit drugs		-0.186	0.059	0.095	0.006	0.002
Alcohol/drug problems in family		-0.026	0.053	0.090	-	0.626
Alcohol/drug problems with close friend		-0.079	0.049	0.092	0.002	0.105
Parents would find out if drank alcohol		0.101	0.041	0.090	0.004	0.015
<i>Family functioning</i>						
Lives with both parents		0.030	0.046	0.089	-	0.511
Family supportive		0.127	0.119	0.099	0.001	0.289
Ask parents for help with personal problems		0.129	0.049	0.091	0.005	0.008
Family rules are clear		0.116	0.051	0.092	0.003	0.022
Parents control everything		-0.113	0.042	0.096	0.005	0.007
Parents ask my thoughts before family decisions about me are made		0.126	0.045	0.092	0.005	0.005
Parents overprotect		-0.159	0.046	0.095	0.008	0.001
<i>Neighbourhood</i>						
Number homes lived in since birth						
(>7 years is the reference category)	1-3	-0.017	0.056	0.089	-	0.939
	4-6	-0.032	0.061	0.089	-	0.593
Years at current address						
(>5 years is the reference category)	<1	0.003	0.061	0.089	-	0.962
	1-5	0.012	0.044	0.089	-	0.794
Safe neighbourhood		0.114	0.053	0.094	0.003	0.031
Clean neighbourhood		0.010	0.052	0.090	-	0.847
Theft/vandalism in neighbourhood		0.033	0.045	0.092	-	0.464
Violence (any) in neighbourhood		-0.095	0.044	0.093	0.003	0.030
Domestic violence in neighbourhood		-0.106	0.049	0.093	0.003	0.030
Participated in sport/recreation activities during last 12 months		0.077	0.047	0.093	0.002	0.101
Participated in youth group activities during last 12 months		-0.042	0.045	0.093	0.001	0.345

Table E.3 continued...

		B	SE(B)	R <sup>2</sup>	R <sup>2</sup> change	p (F change)
<i>School</i>						
Ever skipped school		-0.128	0.052	0.098	0.004	0.015
<i>Psychological scales</i>						
Low personal self-efficacy <sup>*</sup>		-0.151	0.043	0.101	0.010	<0.001
Low self-esteem <sup>†</sup>		-0.241	0.063	0.100	0.007	0.001
Low self-esteem <sup>†</sup> (males)		0.277	0.136	0.103	0.003	0.041
SDQ Emotional difficulties <sup>‡</sup>		-0.156	0.004	0.098	0.005	0.004
SDQ Conduct problems <sup>‡</sup>		-0.150	0.047	0.099	0.006	0.002
SDQ Hyperactivity <sup>‡</sup>		-0.231	0.051	0.100	0.007	0.001
SDQ Hyperactivity <sup>‡</sup> (males)		0.301	0.092	0.107	0.007	0.001
SDQ Peer problems <sup>‡</sup>		-0.129	0.051	0.097	0.004	0.012
SDQ Prosocial <sup>‡</sup>		-0.113	0.051	0.096	0.003	0.026
SDQ Total difficulties <sup>‡</sup>		-0.074	0.085	0.108	0.015	<0.001
SDQ Total difficulties <sup>‡</sup> (females)		-0.209	0.101	0.111	0.003	0.038
<i>Friendships</i>						
Experienced negative treatment by others		-0.164	0.136	0.096	0.001	0.230
Any close friends		-0.154	0.124	0.089	0.001	0.215
Importance of friendships		0.158	0.061	0.091	0.004	0.010
Friends mainly from school		0.120	0.049	0.092	0.004	0.014
Friends of both sexes		0.049	0.043	0.089	0.001	0.248
Friends mainly of same sex		0.057	0.043	0.089	0.001	0.184
Friends mainly of opposite sex		-0.047	0.060	0.089	-	0.435
Friends mainly of same age		0.125	0.044	0.093	0.005	0.005
Friends mainly older		-0.046	0.048	0.089	0.001	0.337
<i>Romantic relationships</i>						
Relationship status (Committed)		-0.041	0.062	0.089	-	0.505
Current relationship status/duration:	<1 year	-0.142	0.053	0.092	0.004	0.016
	≥1 year	-0.087	0.077	0.093	0.001	0.258
<i>Age of partner</i>						
<i>Sexual behaviour</i>						
Sexual attraction (Heterosexual)		0.080	0.074	0.091	0.001	0.279
Age at sexual debut:	≤15	-0.034	0.141	0.089	-	0.826
	≥16	-0.077	0.170	0.089	-	0.652

Note: Each variable entered individually in addition to the Base model. Variables were not tested if they were not found to be statistically significant in Table E.1

Reference category: Female – not sexually active

\* Score derived from Cowen's Personal Self-Efficacy Scale (Cowen, et al., 1991).

† Score derived from Rosenberg's Self-Esteem Scale (Rosenberg, 1989).

‡ Score and sub-scales derived from Strengths and Difficulties Questionnaire (Goodman, 1999).

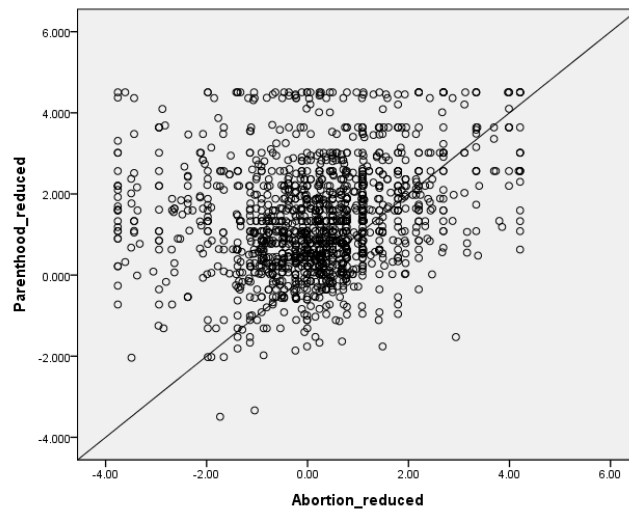
## APPENDIX E

Results relating to application of the "Adolescent Attitudes to Contraception Scale"

## APPENDIX F

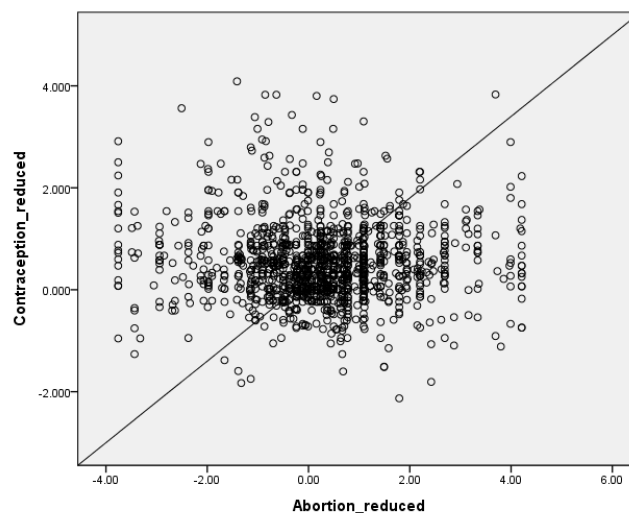
### *Correlations between the three attitude scales*

There was a weak but statistically significant positive correlation between locations for the “Adolescent Attitudes to Abortion (AAA) Scale” and the “Adolescent Attitudes to Adolescent Parenthood (AAP) Scale” ( $R=0.219$ ,  $p<0.001$ ). Figure F.1 shows the scatterplot of locations.



**Figure F.1.** Scatterplot of correlation between Rasch abortion and adolescent parenthood attitude locations.

There was no statistical correlation found between the “Adolescent Attitudes to Abortion (AAA) Scale” and the “Adolescent Attitudes to Contraception (AAC) Scale” ( $p=0.143$ ). Figure F.2 shows the scatterplot illustrating this relationship.

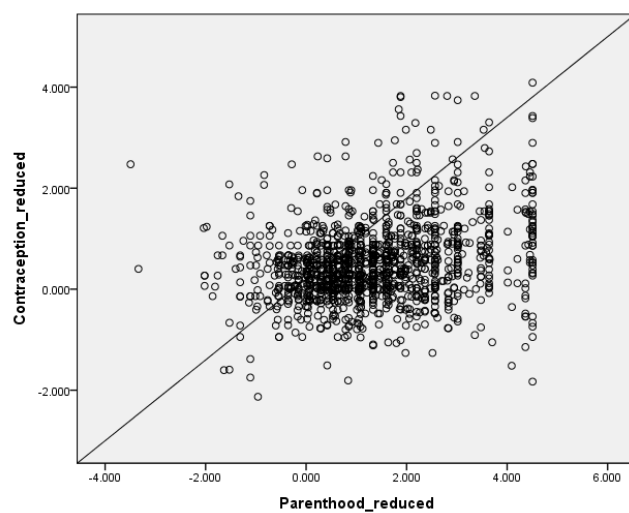


**Figure F.2.** Scatterplot of correlation between Rasch abortion and contraception attitude locations.

There was a weak but statistically significant positive correlation between locations for the “Adolescent Attitudes to Contraception (AAC) Scale” and the “Adolescent Attitudes to Adolescent Parenthood (AAP) Scale” ( $R=0.262$ ,  $p<0.001$ ). Figure F.3 shows the scatterplot of locations.



APPENDIX F  
Correlations between the three attitude scales



**Figure F.3.** Scatterplot of correlation between Rasch contraception and adolescent parenthood attitude locations.